MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for September, 1898, is based on about 2,940 reports from stations occupied by regular and voluntary observers, classified as follows: 147 from Weather Bureau stations; numerous special river stations; 32 from post surgeons, received through the Surgeon General, United States Army; 2,583 from voluntary observers; 96 received through the Southern Pacific Railway Company; 29 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 31 from Canadian stations; 20 from Mexican stations; 7 from Jamaica, W. I. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Dr. Mariano Bárcena, Director of the Central Meteorological and Magnetic Observatory of Mexico; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; and Commander J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to generally conform to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

The most important meteorological event of September, 1898, was the hurricane which visited the Windward Islands of the West Indies on the 10th and 11th.

As shown by the report, published herewith, of the United States Weather Bureau observer at Bridgetown, the storm was particularly destructive throughout the Island of Barbados, where 83 persons were killed, 150 injured, and property to the estimated value of $2,500,000 was destroyed. At St. Vincent and St. Lucia the violence of the hurricane during the 11th appears, from a report rendered by Mr. H. Powell, Curator of the Botanic Garden at Kingston, St. Vincent, to have equaled or exceeded that manifested at Barbados the night of September 10. Accurate information regarding losses on these islands is not, however, at hand. After the 11th the hurricane center moved northwestward with a very marked loss of strength, and finally disappeared east of the Bahamas during September 14.

The action of the Weather Bureau in issuing warnings and advisory reports in connection with this hurricane is detailed in the description of the storm which follows, and the hurricane track, together with the general distribution of atmospheric pressure which attended the progress of the storm is plotted on special charts which appear in this issue of the REVIEW.

On September 25 a second storm of tropical origin appeared as a feeble disturbance over the eastern part of the Gulf of Mexico. During the 26th this storm moved northeastward over the Bahamas, where it developed almost hurricane violence and caused considerable damage on some of the more northern islands of that group. Atlantic coast ports and interests were advised of the progress and character of this storm, which was not, however, severely felt on the United States coasts. Unfortunately the Nassau, Bahamas, morning report of the 26th was not received, and warning of the storm's increasing intensity could not, therefore, be given until the receipt of a special noon report from Nassau. The path of this storm is platted as low area X.

During the last two days of September a storm developed in the vicinity of the island of Santo Domingo, and moved thence northwestward to the south Atlantic coast of the United States, where it raged with hurricane violence during October 2. This storm will be made the subject of a descriptive article in the MONTHLY WEATHER REVIEW for October, 1898.

No reports showing severe storms have been received from the Pacific coast districts, and no serious disturbance occurred in the Chicago forecasting district.

THE WINDWARD ISLANDS HURRICANE OF SEPTEMBER 10-11, 1898.

Although the weather over the Lesser Antilles had been unsettled for several days there was no certain evidence of an approaching hurricane until September 10, when the

regular morning reports, supplemented by a special report, cabled at 12:40 p. m. by the United States Weather Bureau Observer at Bridgetown, Barbados, showed the presence of a cyclonic disturbance southeast of the Windward Islands.

Hurricane warnings were immediately cabled to Weather Bureau stations in the Lesser Antilles, and the officials in charge were directed to give the widest possible distribution to the warnings in their respective districts. They were informed that the hurricane would move from a point southeast of Barbados slowly northwestward with increasing force. Advisory messages were sent to other islands cooperating in the work of observation and report as far west as Jamaica and eastern Cuba, and to points on the South American coast of the Caribbean Sea, and also to Admiral Watson's fleet lying in the harbor of Caimanera, Cuba.

Moving in a northwesterly direction the storm passed over Barbados the night of September 10, and reached St. Vincent and St. Lucia during the day of September 11. The character of the hurricane at the islands visited is indicated by the following extracts from the local press and reports of observers:

The Barbados Agricultural Reporter, September 13, 1898:

Saturday night, the 10th of September, 1898, will live forever in the memory of the present generation of Barbadians. Never since the memorable 11th of August, 1831, has the island been visited by such a fearful hurricane, which extended over the period of ten hours during the dark and dreary watches of the night. For days previous much rain had fallen, but the barometer remained steady, and it was only on Saturday evening that it gave signs of the approach of a hurricane. By 7 p. m. it had dropped to 29.669, and the howling, fitful gusts of wind proclaimed the rapid approach of the storm. Previous to this the observer at the United States Weather Bureau, Mr. P. McDonough, had warned the harbor authorities of the situation, and the captains of the various craft in port were also warned to be on the outlook. The blow began about 7:30 p. m. on Saturday, and continued until 4 a. m. Sunday.

The Barbados Advocate, September 17, 1898:

Fiercer and more destructive hurricanes may have visited the West Indies in years past, but taking into consideration the general condition of her industry and its gloomy prospects, never has a more appalling calamity fallen on this island since first it rose out of these western seas, than the fearful hurricane that ravaged it from shore to shore on Saturday night last.

Saturday morning was dark and lowery, and the indications of approaching bad weather were strong. At noon Mr. McDonough, of the United States Weather Bureau, notified the public that a hurricane was fast approaching Barbados. The barometer had been falling rapidly. At 6 p. m. the clouds gathered densely in the northeast, and the wind commenced to blow freshly from that point. The rain fell heavily, and the clouds continued to gather in dark, ever-wheeling volumes, the higher banks forming scuds flying rapidly to various points; at 7 p. m. the barometer had fallen to 29.66, and the wind had increased in force and violence until a strong gale was blowing. At 9 p. m. the wind was blowing with hurricane force.

Report of Mr. P. McDonough, observer, United States Weather Bureau:

The weather on the days immediately preceding the date of the hurricane was nothing out of the ordinary. Showers had been frequent from the 1st to the 10th without any material change in the barometer. A sharp look out was kept for the movement of the upper clouds when the state of the sky permitted, and those observed were principally cirro-stratus from the south. Three or four days preceding the date of the hurricane the sky was unusually overcast, and but little opportunity presented for observing the movement of the upper clouds. In the early forenoon of the 8th cirrus clouds appeared moving from the southwest, with the wind northeast, and some cumulus which in the early morning moved from the northeast, changed direction to the southeast, the weather becoming rapidly threatening, with an unusual number of showers. During the 9th there were frequent light showers with intervals of sunshine, but in the afternoon the sky put on an unusually threatening appearance with alto-stratus moving from the east and cumulo-nimbus from the northeast. A very faint solar halo was observed at 4 p. m. The wind was generally from the northeast, with the barometer falling slightly. A thunderstorm occurred in the early morning of the 10th with light rain which ended at 4 a. m. There was a light shower between 10:50 a. m. and 12:30 p. m., and from 1:15 p. m. throughout the night.

Cirrus clouds were observed moving rapidly from the south in the morning of the 10th, changing formation to strato-cumulus and nimbus from the northeast early in the forenoon. The weather was muggy and oppressive, but temperatures were not abnormally high. Wind generally northeast, but backing to the north. The barometer rose slightly until about 9 a. m., and began to fall from about 11 a. m. The weather in the meantime became very threatening, with light sprinkling rain. The sea became heavy, with a heavy swell from the southeast. From 2 p. m. to 5:45 p. m. the barometer fell very slightly, and there was no increase in the wind force, which changed to the north. Immediately after 6 p. m. the barometer fell very rapidly, the wind freshening up, and almost suddenly attained the velocity of a gale, with a heavy downpour of rain, which continued during the night. The wind blew steadily from the northeast from 7 p. m. to near midnight, when it changed to the north. While the wind may appear from the records to have increased in force steadily, yet it is characteristic of the winds at this place to blow in strong gusts, and during the passage of the hurricane on the night of the 10th, winds of this character were quite frequent and they must have attained a much greater velocity than is shown on the anemometer record sheet. It was one of these blasts that carried the instrument shelter from the roof, and blew down the wind vane and anemometer support. The greatest velocity for five minutes was 62 miles per hour, N.E., 10:01 p. m., and the greatest for one minute, when the apparatus was blown down, 10:18 p. m., was at the rate of 75 miles per hour. The instrument shelter was destroyed and the instruments within it were broken or rendered unserviceable. The wind vane support was bent out of shape and vane was broken. The tipping bucket rain gauge was upset, but not rendered unserviceable. There is no self record of wind or rainfall from 10:18 p. m. until after the a. m. observation on the morning of the 11th, as the wind blew with such violence during the night of the 10th that it was impossible to make any temporary repairs by which the record could be continued. The wind changed to the north about 11 p. m., and it is my belief that it attained a much greater velocity between 11 p. m. and midnight than at any other time. It abated some after midnight, but a strong gale was maintained up to the observation on the morning of the 11th.

The barometer reached its lowest, 29.462 at 9:20 p. m., after which it rose rapidly.

During the storm there was a remarkable electric display over the entire heavens, but no thunder was heard. In the southwest, at a great distance, there appeared a brilliant, permanent light, but no explanation can be given of this phenomenon. Many persons have reported having experienced an earthquake shock, but none was felt at this office.

The rainfall from 6 p. m. of the 10th to 10:30 a. m. of the 12th was very heavy, 11.42 inches falling in that time.

In the table which follows will be found the most salient meteorological features connected with the storms.

Time.	Barometer, reduced to sea level.		Wind, Sept. 10.		Rainfall, inches.	
	Sept. 10.	Sept. 11.	Vel.	Dir.	Sept. 10.	Sept. 11.
1 a. m.	29.90	29.65	9	ne.	....	.60†
2	29.88	29.68	6	ne.	....	.40†
3	29.88	29.71	9	ne.	....	.30†
4	29.88	29.74	8	ne.	....	.25†
5	29.88	29.77	7	e.	....	.25†
6	29.89	29.80	7	ne.	....	.45†
7	29.90	29.81	9	ne.	....	.26
8	29.91	39.85	11	ne.	....	.17
9	29.92	29.88	11	ne.	....	.19
10	29.91	29.89	12	ne.	....	.29
11	29.90	29.89	9	ne.	....	.02
12 noon	29.87	29.88	8	ne.	.01	.20
1 p. m.	29.81	29.87	7	n.	T.	.07
2	29.79	29.86	11	ne.	.08	.11
3	29.76	29.83	9	n.	.02	.10
4	29.75	29.83	10	n.	.01	.42
5	29.73	29.87	13	n.	.02	.59
6	29.70	29.88	17	n.	.13	.28
7	29.58	29.88	31	ne.	.07	T.
8	29.55	29.90	36	ne.	.20	.07
9	29.47	29.92	43	ne.	.59	.19
10	29.49	29.91	54	ne.	.63	.27
11	29.55	29.90	*	n.	1.00†	.01
12 midnight	29.59	29.88	*	n.	.85†	T.

* Anemometer blown down. † Estimated.

In connection with the movement and development of the hurricane the following extracts furnished by Captain Mortois, of the French barque *Tourny*, sailing from Calcutta, may be of interest:

Midday, September 9, latitude 12° 2′ N., longitude 54° 2′ W., from Paris, ran into hurricane. Strong wind blowing from northeast, with heavy swell. Barometer 29.6, wind increasing in force after midday, and barometer falling one-tenth inch per hour from 4 p. m., reaching 29.1 at 7 p. m. Wind during that time changing from northeast to north-northeast, with heavy rain squalls. At 7 p. m., bright lightning in the southwest, barometer rising, reaching 29.5 at about midnight,

and wind went to southwest, blowing exceedingly strong. At 11 p. m., relative calm, but tremendous sea. On the 10th, about 350 miles to the east of Barbados, 7 a. m., the barometer read 29.7. Calm until midday, wind afterwards going to the northeast. From 10th to 12th, vessel driven 60 miles northward out of her course. Strong current during that time moving toward the northwest. On the 13th, it was observed that another current, but not so strong, was moving toward the northwest. The vessel lost all sail, and her cargo of rice nearly a total loss. The vessel reached Barbados on the 15th. While on board the vessel an examination was made of the captain's barometer and it was found to read about 0.25 too low.

It was very fortunate that there were so few vessels in the bay and harbor on the day of the storm, as it affords little or no protection. The British man-of-war *Alert* departed at about 6 p. m. to avoid the storm. Of the small vessels in the harbor and bay, nearly all of them took precautions to weather the storm by putting out extra anchors and lines, which proved of little value, as most of them were driven out to sea or else beached. The following ships were anchored in the bay and with extra anchors out were driven before the wind and totally wrecked on the reefs at St. Vincent, about 100 miles to the westward:

Full-rigged ship *Loando*, 1,448 tons; bark *Lapland*, 582 tons; and barkantine *Grace Lynwood*, 600 tons. The crews of these vessels were saved.

Barkantine *Lovdahl*, 342 tons; local vessels, *Kate Florence*, *Florence B. Parr*, Government water boat *Florence*, steam crane and dredger all were driven out to sea and have not been heard from.

The following local vessels were driven on the reefs on the shore at this city:

Campania, *Elmo*, *Ocean Traveller*, and a large number of lighters, all of which are a total loss. The water department steamer, *Ida*, was also driven on the reefs here, but was gotten off without much damage. A large number of shore boats and lighters were driven out to sea and swamped.

The destruction of property throughout the island has been very great. Every part of the island suffered, but the eastern and southern portions most. It will take some time to get anything like an accurate estimate as to its value.

In this city the damage to property has been very great, especially in the suburbs. The business part of the city suffered very little, other than that caused by rain. The residential and unprotected portions of the city suffered very much, and it would be impossible to give a detailed description of the houses and trees strewn over the various streets in those sections of the city on the morning of the 11th. Such chaos I never witnessed, and have no desire to experience anything of the kind again. While the houses blown down are frail—frame buildings—yet the largest kind of trees were either broken in two or lifted out of the ground by the roots. Nearly all the trees that were blown down, as far as I have seen, were blown down toward the east or south, and a large number of the houses fell outward. The trees left standing had their foliage cut off as if done with a knife or an axe, this is especially true of the palms. Two stone bridges are seriously damaged, one so badly that it has been railed off to prevent traffic. A portion of the wharf was undermined and carried away, and during the night of the 10th the seas came over portions of the wharf into the streets.

Many of the streets were impassible for several days after the storm, especially for vehicles. The street car service was prostrated on the 11th, and but little service given on the 12th.

The entire telephone system was prostrated, thousands of poles being blown down and the repairs necessary will be almost equal to establishing a new plant.

No storm of like nature is remembered by the oldest reputable citizens, and many compare it to that of 1831, but statistics do not support them in that assertion as will be seen from the following comparative data:

Hurricane of August 10-11th, 1831, total killed, 1,477 outright; total injured, 310, of which 114 died; value of property destroyed, $7,397,532.

Hurricane of September 10-11th, 1898, lives reported lost to date, 83; estimated injured, 150; estimated value of property destroyed, $2,500,000; total number of houses totally destroyed, 5,062, and number more or less damaged, 2,359. The number of people estimated to be rendered homeless is set at between 40,000 and 45,000, and this is not considered an overestimate.

It is too early to get an estimate as to the damage to the sugar cane crops, but it is expected to be considerable. The damage done the various plantations in the eleven parishes of the island is very great and means ruin to some.

On Saturday afternoon of the 10th the public, as far as I could do so, was informed of the impending conditions. It being so long since this island was visited by a very destructive storm many believed it immune from such destructive agencies, and pooh-poohed the information given out.

It is not known as to the extent the general public benefited by the information obtained from this office, but I have been informed by some that by acting upon the information given them they were enabled to take measures to protect their property which otherwise might have been lost.

Between 4 and 6 p. m. of the 10th there were about 200 personal inquiries made at this office, and nearly as many telephone calls during the afternoon, relative to the approaching storm, and all were advised as to the danger anticipated.

Extract from report of the hurricane at St. Vincent, W. I., September 11, 1898, by H. Powell, curator, Botanical Gardens:

The barometrical readings have been corrected for index error, elevation, and temperature. Station: Botanic Gardens, Kingstown, St. Vincent, W. I. Height above sea level, 203 feet; longitude, 61° 15′ W.; latitude, 13° 10′ N.

Indications of the coming storm were manifest in the usual borometrical disturbances. The readings ranged from 29.926 at 3 p.m. on the 6th to 29.838 at 3 p. m. on the 10th.

The latter reading at once caused alarm, and notice of same was sent through the telephone to the police headquarters and other centers, for dissemination.

Later in the evening the barometer continued to fall, and messages were again sent in the usual manner.

At 5:55 on the following morning (Sunday, September 11) the reading was 29.724. The wind at this time was blowing in short but fitful gusts from north and northwest. * * * The barometer continued to fall slowly, and the wind, still blowing from the same quarter, freshened considerably, so much so that a tall cabbage palm was snapped in two and branches of the softer wooded trees were torn off shortly after 7 a. m. Between 7 and 8 a. m. telephonic communication was interrupted. At 9 a. m., the usual ordinary hour of recording observations, the barometrical reading was 29.606. The wind was then rushing from between north and west. At 10 a. m. the barometer had fallen to 29.539, and it was at this hour that the storm was seen to have commenced in earnest. Large branches of trees were being torn off and carried away. The first part of the storm lasted from 10 a. m. to 11:40 a. m. The wind still continued blowing from north, northwest, and west, and increased in such force at 11 a. m. that the largest trees were uprooted.

The following barometrical readings, taken at the time specified, show the rapid fall of the mercury and the awful violence of the storm:

a. m.		a. m.	
10:00	29.539	11:20	28.719
10:30	29.409	11:25	28.669
10:55	29.119	11:35	28.519
11:10	28.819	11:40	28.509

At 11:40 a. m. there was a lull and almost a dead calm for about three-quarters of an hour. * * * The rain gauge was emptied, and 4:94 inches were found to have fallen between 9 a. m. and 12 noon. At about 12:25 p. m. the wind suddenly began to blow from due south and increased in force every minute. Trees and houses in the same exposed positions which had withstood the first part of the hurricane were now hurled to the ground. Between 1 and 2 p. m. the storm reached its highest point, the velocity of the wind far exceeding that of the forenoon. This continued until about 2:20, when the wind slackened considerably. During the lull between 11:40 and 12:30 the barometer remained steady at 28.509, and then commenced to rise slowly, and afterwards arose almost as rapidly as it had previously fallen. At 3 p. m., the usual hour for recording observations, it had risen to 29.533, and the storm had so abated as to render it safe to go outside. Up to now the rain had descended in torrents, but, unfortunately, the rain gauge had been knocked over by a large branch of a tree.

From 12 noon to 3 p. m. fully as much rain must have fallen as that registered between the hours of 9 a. m. and 12 noon. From 3 p. m. of the 11th to 9 a. m. on the 12th, 4.23 inches fell, the total rainfall thus actually measured during the twenty-four hours was 9.17 inches. The actual time of the duration of the hurricane was as follows: 10 a. m. to 11:40 a. m., 12:25 p. m. to 3 p. m. From 10 a. m. to 11:40 a. m. the mercurial barometer fell 1.030 inches, viz, from 29.539 to 28.509. As previously stated the wind at the commencement of the storm blew from north, and subsequently from northwest. When the first part of the storm was at its highest it was blowing from northwest to west, but was hardly stationary at any point.

After the lull between 11:40 and 12:25 it blew directly from the south and occasionally south-southwest. From 3 p. m. the barometer rose very slowly, and at 7 p. m. the reading was 29.771. Distant thunder and lightning was recorded at intervals during the morning and afternoon. * * * As illustrating the violence of the wind the heavy garden seats were toppled over as though they were playthings. Nearly the whole of the large trees in the Botanic Garden and Government House Grounds, and also in the surrounding country, have either been partly destroyed or thrown down.

The velocity of the wind during the first part of the storm, between 11 and 11:40, was from 50 to 60 miles an hour, and between 1 and 2 p. m. during the second part of the storm it was fully 90 to 100 miles.

There are persons still living in St. Vincent who clearly remember the "Great Hurricane" of the 11th of August, 1831, and who state that the present one is in every way far more destructive.

The cyclone of the 16th August, 1886, is said to have lasted but a few minutes. Aneroid readings taken at that time are given as 29.300.

Compared to the present hurricane the one of 1886 is said to have been mere "child's play."

Out of a total number of 356 hurricanes recorded as having taken place in the West Indies during the last 308 years, 246 occurred in the months of August, September, and October.

It is recorded that in the hurricane of Guadaloupe, September 6, 1865, the barometer at Marie Galante fell 1.693 inches (from 29.646 to 27.953 inches) between 6*h*. 30*m*. and 7*h*. 40*m*. a. m., i. e., in an hour and 10 minutes.

Report of William B. Stockman, Weather Bureau Forecast Official, at the Central Station of the West Indian Weather Service at Kingston, Jamaica:

The conditions obtaining at Port of Spain on the morning of Saturday, September 10, led me to believe that hurricane conditions were indicated to the south-by-eastward of that station, but the apparent rise in barometer from the preceding evening caused me to deliberate, feeling assured that were I correct the conditions would develop sufficiently to insure the voluntary sending of specials from Port of Spain or Bridgetown. Immediately upon the receipt of the p. m. reports of the 10th. I ordered hurricane signals hoisted at Bridgetown, St. Pierre, St. Kitts, and St. Thomas.

From the Daily Gleaner, Kingston, Jamaica, September 16, 1898:

Among the most notable features attending the hurricane, was the action of the United States Weather Station at Half Way Tree. This station was only established a few weeks ago, under the scheme of the Washington Bureau for covering the meteorological observation of the West Indies more effectually than heretofore; and already the new station has more than justified its existence. From the data which, with more or less regularity, have been coming to hand, Mr. Stockman, on Saturday night, cabled hurricane warnings to Barbados, Martinique, St. Kitts, and St. Thomas. The message prognosticated a hurricane, immediately, the central portion of which was south of Barbados, that its direction was moving north-northwesterly and increasing with northerly wind and rains. Every one of these details has been substantiated. Fortunately, as we have seen, the warning was not required for the two more northerly of the islands notified; the hurricane abating its force somewhere in the region of St. Kitts. The Weather Bureau has distinctly shown that it can not alone inform people that a hurricane has taken place, after the damage is done, but can give sufficient warning before hand to prepare masters of vessels for impending danger.

The storm did not attain great severity at other of the Windward Islands, except in the effect of heavy sea swells, high tides, and heavy rain. The Weather Bureau Observer at St. Kitts reports that—

While the hurricane passed that island with only a slight brush, doing no material damage, the public expressed a high appreciation of the warning of the approach of the storm, and that the warning, being verified, established confidence in the Service.

After September 11 this storm lost strength rapidly, and there is no evidence at hand to show that during its subsequent northwesterly course over the eastern Caribbean Sea and the ocean to the northward it exhibited destructive violence.

The distribution of atmospheric pressure, as shown by the morning and evening reports of September 10 and 11, is presented on Charts XIV and XV, and the path of the disturbance, after the 11th, is plotted on Chart XV.

In referring to the work of the Weather Bureau in connection with the hurricane of September 10–11, and the south Atlantic coast storm of October 2, the New York Times of October 5, 1898, commented, editorially, as follows:

There is full justification for the pride with which the Weather Bureau officials call attention to the triumphs of their new West Indian service. Though hardly well established yet, that service has already demonstrated its value beyond all question by giving timely warning of two great storms. To be sure, enormous damage was done in the one case at Barbados and St. Vincent, and in the other on our own southern coast, but of course hurricanes will not be made harmless, even when accurate predictions of their approach are made. The most that can be expected is to save many vessels at sea and many lives on shore. That both of these things were done by the Weather Bureau's forecasts of the recent tempests is certain. The new stations have begun extremely well. Even now they have paid expenses for years to come, and it is a source of gratification that their benefits, instead of being monopolized at home, have been shared by friends beyond our frontiers.

The following is an extract from an editorial which appeared in the New Orleans Times-Democrat of September 24, 1898:

We were able to test this new service in the recent hurricane of September 10 and 11. The storm which prevailed then was first noticed in an inchoate condition near Barbados on September 10. All the other West Indian islands were notified from Washington, and it was in consequence of that notice that the Spanish vessels at San Juan de Porto Rico, which were to have sailed for Spain on that day, delayed doing so, escaping the storm and saving, in all probability, many lives by their delay. Every seaport that could be reached by telegraph was notified; the vessels remained in harbor, and the hurricane—a very severe one—swept through the Caribbean and Gulf of Mexico without injuring a single vessel. So much for our new weather stations. There was some loss of life in the interior of the islands where the warning could not reach in time, but this was infinitesimal compared with the damage that might have been done and would have been done had the approach of the storm not been known one or two days beforehand.

The hurricane was very severe among the smaller Antilles, and wasted most of its force before it reached Cuba. All we caught of it was a violent rainstorm. But although it was not as widespread as some other Gulf hurricanes, it was as severe in its intensity where it did rage. By the warning given by our weather service, property in value a hundred times the cost of the service was saved. The wisdom of the new stations is thus clearly proved. Louisiana ought to appreciate the improvement, for probably no part of the country is more affected and more directly interested in hearing of the approach of these hurricanes. With timely notice vessels will not leave here in the face of a storm. The thousands of fishermen along the coast can receive warning in time and escape the fate of their comrades at Cheniere Caminada. Finally, the sugar and rice crops are deeply interested in knowing of an approaching blow, which will give the planters and farmers a chance to care for the crops, to harvest the rice or cut the cane before the storm breaks over them.

In enumerating the benefits of the war we must not overlook the improvement it has assured us in our weather service on the Gulf and south Atlantic, an improvement that would scarcely have been made—certainly not made for years—if the safety of Sampson and Watson's fleets and Shafter's army had not demanded the establishment of additional weather stations in the West Indies.

THE CHICAGO FORECAST DISTRICT.

The frost warnings issued on the 5th, 6th, 8th, 9th, and 10th were, as a rule, verified, although in some instances the area covered by the warnings was too great.

No general windstorm passed over the upper Lake Region during the month. The wrecks which occurred on the 19th over the northern portion of the Lakes were mainly due to dense smoke, brought by the winds from the British Northwest. The winds were only fresh to brisk northwesterly, except at the "Soo," where a high wind prevailed for a short time. The wind force and direction were covered by the upper Lake forecast.—*H. J. Cox, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

California was visited by a general and quite heavy rain on September 24, 25, and 26. The approach of this storm was seen on the evening charts of September 23, and forecasts were issued for all points in California north of the Tehachapi Mountains. On the next morning warnings of the approach of this storm were sent to all points in southern California. Thousands of crates of raisins and prunes were exposed for drying. The warnings, which were twenty-four to forty-eight hours in advance of the rain, gave ample time for protection.

THE EARLY RAINS.

Referring to benefits derived from forecasts of early rains, issued by the Weather Bureau Office at San Francisco, Cal., the San Francisco Call of September 27, 1898, remarks, editorially, as follows:

Our early rains have begun this year with showers of such profusion as to give promise that we are to have anything rather than a dry winter this season. They have, moreover, been widespread, and have carried their blessings to almost every section of the State.

That some damage will result from such general rains this early in the year is certain. A considerable part of the prune crop is in process of drying, and the rain where it has been heavy will entail loss of some of the fruit and a good deal of expense in saving the rest that was exposed to the showers. Moreover, the grape crop may be more or less hurt, but reports are to the effect that the injury to that crop is not expected to be great in any part of the State.

It is worth noting that from nearly all the centers of the fruit and grape industry it is announced that the warnings of the Weather Bureau of the coming of the showers were given in time to enable the orchardists and vineyardists to prepare for them. Prunes that had been spread for drying were stacked before the rains came, and the loss, therefore, was much smaller than it would have been otherwise. The usefulness of the Bureau has thus been again demonstrated, and when all rural workers learn to pay attention to its reports the profit from its labors will be even greater than now.

In any case, however, the losses from the showers would have been slight in comparison with the gains that will result from the early coming of the beginning of the rainy season. The drought has been long and severe; it was beginning to tell upon the vitality of the orchards in many sections, and fears were expressed whether the trees would be able to form buds for the fruit of next year. The showers have come in time, it is to be hoped, to put an end to all anxieties on that score, and to give every rural industry reason for the hope of an abundant harvest in 1899.

W. H. Hammon, Forecast Official.

FORECASTS TO MILITARY CAMPS.

During September, 1898, provision was made, by direction of the Secretary of Agriculture, to telegraph from the Central Office of the Weather Bureau at Washington, forecasts to commanding officers of the several Army corps whenever weather conditions injurious to the health or comfort of troops under canvass were expected in the States where the Army corps were located. An appreciation of these forecasts is indicated by the following press notes:

New York Evening Telegram, September 16, 1898.

CAMP WIKOFF, MONTAUK POINT, L. I., *September* 16, 1898.

A severe storm set in here last night and continued this morning. The camp authorities had been warned of its approach by the Weather Bureau and were prepared for it. Every tent had been strengthened, and the storm did no damage in camp, except to make it cold and cheerless.

New York Times, September 24, 1898:

CAMP WIKOFF, MONTAUK POINT, L. I.

A storm, brief but violent, swept over the camp last night and this morning, but did no serious damage. The storm warning from the Weather Bureau saved a worse experience, for everything was made snug last night.

AREAS OF HIGH AND LOW PRESSURES.

During the month the paths of seven high areas and of nine low areas have been traced on Charts I and II. It should be noted that these conditions are often extremely indefinite, and it is an open question whether it is possible to trace them with anything like the accuracy assumed in these charts. Often a disturbed condition will cover many thousands of square miles, and the position of the lowest pressure in this region from day to day does not indicate a motion in a low center, but rather an effect of the disturbance. Whenever the path is on the edge of the region of observation it will be understood that the position of the center of high or low is somewhat indefinite, also the pressure recorded at such low center is only that at the nearest point of observation and may differ widely from the pressure at that exact point. The accompanying table gives the principal facts regarding the place of origin and disappearance, the duration and velocity of these highs and lows, and the following remarks are added.

Highs.—Four of the highs developed off the Pacific coast, two to the north of Montana, and one in the middle Missouri valley. No. III disappeared in Texas, but all the others could be traced to the Atlantic coast. The temperature changes accompanying the highs were very moderate, only three of them showing any marked fall. As No. I approached the middle Rocky Mountain region the afternoon of the 6th a fall in twenty-four hours of 32° occurred at Oklahoma, and the fall of 20° covered a region of 250,000 square miles. As high area No. II moved to south Dakota, afternoon of 9th, a fall of 30° occurred all over Kansas.

Lows.—There is a remarkable uniformity in the motion of the continental lows in that all but two started north of the fiftieth parallel and maintained their courses to the north of the region of observation till they reached the north Atlantic coast. No. I began in south Idaho and was last noted in the middle Mississippi valley. No. VII was first noted in the west Gulf, afternoon of 17th. This was of slight intensity, as it was held back by high pressures to the north and east; for this reason, also, its velocity, 15.2 miles an hour, was the slowest of the month. During the 9th, 10th, and 11th a storm center moved from the central part of the Gulf of Mexico northwestward to the Louisiana coast, attended by heavy rain and high northeast winds along the middle Gulf coast. During the 12th this storm passed rapidly northward and joined low area No. IV, over eastern Nebraska, by the morning of the 13th.

The highest winds of the month were as follows: 44 miles an hour at Milwaukee, a. m. of 6th, as No. III moved to the north of Lake Superior, and a wind of 40 miles at Pensacola, afternoon of 30th, caused by a disturbance in the Gulf. The heaviest rain of the month was 7.70 inches in twenty-four hours, at Pensacola, 29–30th of month; the heavy rains of the middle Gulf coast on those dates were caused by a storm which apparently remained nearly stationary over the west Gulf from the 27th to the close of the month.—*H. A. Hazen, Professor.*

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, p. m.	37	124	8, p. m.	40	72	4,080	7.0	583	24.3
II	7, p. m.	55	109	15, a. m.	46	59	3,390	7.5	452	18.8
III	14, a. m.	47	127	18, p. m.	34	101	1,770	4.5	393	16.4
IV	15, a. m.	45	100	17, p. m.	36	78	1,320	2.5	528	22.0
V	17, p. m.	49	125	21, p. m.	41	72	2,820	4.0	705	29.4
VI	21, a. m.	54	117	25, a. m.	47	60	3,320	4.0	830	34.6
VII	21, p. m.	36	123	29, a. m.	38	74	4,080	7.5	583	24.3
Total							20,780	37.0	4,074	169.8
Mean of 6 paths							2,969		582	24.3
Mean of 31.5 days									562	23.4
Low areas.										
I	31, p. m.*	42	114	3, p. m.	40	94	1,230	3.0	410	17.1
II	3, a. m.	51	101	5, p. m.	49	61	1,800	2.5	720	30.0
III	5, a. m.	51	98	8, a. m.	48	61	1,650	3.0	550	22.9
IV	11, p. m.	53	116	14, p. m.	48	87	1,920	3.0	640	26.7
V	13, p. m.	51	117	17, p. m.	48	52	2,880	4.0	720	30.0
VI	16, a. m.	54	107	19, p. m.	49	57	2,160	3.5	617	25.7
VII	17, p. m.	26	98	24, a. m.	41	69	2,370	6.5	365	15.2
VIII	25, p. m.	50	84	28, p. m.	47	59	1,440	3.0	480	20.0
IX	26, a. m.	54	111	28, p. m.	53	96	960	2.5	384	16.0
Total							16,410	31.0	4,886	203.6
Mean of 8 paths							1,823		543	22.6
Mean of 40 days									529	22.0

* August.

RIVERS AND FLOODS.

The light precipitation incidental to the season in the Missouri and middle and upper Mississippi valleys caused the

usual low water stages to prevail. Through navigation from St. Louis northward was suspended during the first week of September, 1898, and logging operations were greatly restricted. On the lower Mississippi a steady decline was noted, but with no serious interruption to navigation, except between St. Louis and Cairo, during the first ten days of the month.

In the Ohio River navigation by large packets and towing craft has been generally suspended, the smaller boats, only, remaining in commission for local traffic.

In the south Atlantic States heavy rains on the 22d and 23d caused a rapid rise in the rivers from southern Virginia southward into South Carolina. Much damage in the way of washouts, destruction of bridges, losses of crops, etc., resulted, and one death by drowning was reported.

Timely warning was given of the flood in the Savannah River on the first day of the month, and all stock and portable property were saved thereby. Of the crops, 90 per cent proved a total loss.

In the Tennessee River navigation proceeded uninterruptedly, the first instance of the kind since 1888, while in the Cumberland, it was practically suspended.

The highest and lowest water, mean stage, and monthly range at 118 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

For fuller details see Monthly Bulletin of the River and Flood Service for September, 1898.—*H. C. Frankenfield, Forecast Official.*

Heights of rivers referred to zeros of gauges, September, 1898.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.	1,957	14	3.2	1.30	2.7	8-10	2.9	0.5
Reeds Landing, Minn.	1,887	12	1.0	3,4,7	0.3	28,29	0.7	0.7
La Crosse, Wis.	1,822	12	1.8	1-7	1.3	{15,16 / 27-29}	1.5	0.5
North McGregor, Iowa	1,762	18	1.3	2-4	0.6	30	1.1	0.7
Dubuque, Iowa	1,702	15	1.2	1,2,5,6	0.5	30	1.0	0.7
Leclaire, Iowa	1,612	10	1.1	7	0.5	29,30	0.7	0.6
Davenport, Iowa	1,596	15	1.8	7	0.8	30	1.3	1.0
Galland, Iowa	1,475	8	1.1	6-8	0.6	{14-21 / 26-30}	0.8	0.5
Keokuk, Iowa	1,466	14	2.4	6	0.0	30	0.7	2.4
Hannibal, Mo	1,405	17	4.2	7	1.5	20,21	2.3	2.7
Grafton, Ill	1,307	23	5.5	9,10	3.3	5	4.4	2.2
St. Louis, Mo.	1,264	30	11.0	19	4.6	6,7	7.4	6.4
Chester, Ill.	1,189	30	7.1	20	2.6	7,8	4.6	4.5
Cairo, Ill	1,073	45	15.5	13	9.3	8	12.0	6.2
Memphis, Tenn	843	33	9.3	15	5.8	10,28,29	7.5	3.5
Helena, Ark	767	42	14.7	1	9.0	11,30	11.7	5.5
Arkansas City, Ark	635	42	18.6	1	9.5	12,13	13.6	9.1
Greenville, Miss	595	42	15.6	1	7.9	13	11.0	7.7
Vicksburg, Miss	474	45	20.5	1	8.6	14	12.6	11.9
New Orleans, La	108	16	6.7	1	3.9	16	5.2	2.8
Arkansas River.								
Wichita, Kans.	720	10	1.9	26	1.1	{2-4, 8-10 / 14-19}	1.3	0.8
Fort Smith, Ark.	345	22	10.4	16	2.8	9,10	5.6	7.6
Dardanelle, Ark.	250	21	10.5	17	2.6	12	5.9	7.9
Little Rock, Ark.	170	23	11.3	18	4.5	12	7.4	6.8
White River.								
Newport, Ark	150	26	13.5	25	2.4	10,12	6.5	11.1
Des Moines River.								
Des Moines, Iowa	150	19	3.2	2-4	2.8	26	3.0	0.4
Illinois River.								
Peoria, Ill	135	14	5.8	25,26	4.4	4	5.3	1.4
Missouri River.								
Bismarck, N. Dak.	1,201	14	3.9	9-10	2.2	29,30	2.9	1.7
Pierre, S. Dak.	1,006	14	3.9	14,15	2.6	26-30	3.1	1.3
Sioux City, Iowa	676	19	6.6	21	5.3	10,11	5.7	1.3
Omaha, Nebr.	561	18	7.6	23,24	6.9	18-20	7.2	0.7
St. Joseph, Mo.	373	10	3.5	6	1.8	22,30	2.3	1.7
Kansas City, Mo.	280	21	9.5	9	7.0	4,20,24,30	7.6	2.5
Boonville, Mo.	191	20	9.7	10	5.8	27	7.3	3.9
Hermann, Mo.	95	24	10.8	18	5.0	6	7.4	5.8

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Ohio River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Pittsburg, Pa	966	22	6.5	10	5.0	30	5.8	1.5
Davis Island Dam, Pa	960	25	3.9	1,10	2.0	21	2.8	1.9
Wheeling, W. Va.	875	36	5.0	1	1.5	28,29	2.7	3.5
Parkersburg, W. Va.	785	36	6.5	1	2.5	29,30	4.1	4.0
Point Pleasant, W. Va.	703	39	5.7	1	1.7	22-24	3.5	4.0
Catlettsburg, Ky	651	50	7.6	2	1.9	24	4.8	5.7
Portsmouth, Ohio	612	50	8.5	2	2.9	24	6.0	5.6
Cincinnati, Ohio	499	50	10.1	1	5.0	27	7.7	5.1
Louisville, Ky.	367	28	5.8	1	3.6	26	4.7	2.2
Evansville, Ind	184	35	11.2	1	4.1	30	6.1	7.1
Paducah, Ky	47	40	11.1	11	3.5	26,27	6.5	7.6
Allegheny River.								
Warren, Pa	177	7	1.0	1	0.0	25-30	0.4	1.0
Oil City, Pa	123	13	2.0	1	0.5	22-25	0.9	1.5
Parkers Landing, Pa.	73	20	1.4	1	1.0	30	1.1	0.4
Freeport, Pa.	26	20	2.9	1	0.9	21-23	1.5	2.0
Conemaugh River.								
Johnstown, Pa.	64	7	2.2	1	1.1	22,30	1.5	1.1
Red Bank Creek.								
Brookville, Pa.	35	8	0.5	1-13	0.2	16-30	0.3	0.3
Beaver River.								
Ellwood Junction, Pa.	10	14	− 0.1	1	−1.0	29,30	−0.7	0.9
Cumberland River.								
Burnside, Ky	434	50	7.0	28	0.5	22	2.1	6.5
Carthage, Tenn.	257	30	3.8	10	1.0	21	1.8	2.8
Nashville, Tenn	175	40	4.7	12	1.7	25	2.5	3.0
Great Kanawha River.								
Charleston, W. Va.	61	30	7.9	7	4.2	28	6.4	3.7
New River.								
Hinton, W. Va.	95	14	3.8	6	1.2	20-22	2.0	2.6
Licking River.								
Falmouth, Ky.	30	25	1.0	1,2,6-8	0.5	21-23	0.8	0.5
Miami River.								
Dayton, Ohio	69	18	2.0	26	0.8	1,2	1.3	1.2
Monongahela River.								
Weston, W. Va	161	18	1.7	8	−1.2	3,4	−0.5	2.9
Fairmont, W. Va	119	25	2.0	8	−0.2	3,4	0.4	2.2
Greensboro, Pa.	81	18	8.0	8,9	6.3	22-26	6.7	1.7
Lock No. 4, Pa.	40	28	7.6	9	5.6	24,25	6.1	2.0
Cheat River.								
Rowlesburg, W. Va.	36	14	2.8	8	0.8	{18-23 / 27-30}	1.5	2.0
Youghiogheny River.								
Confluence, Pa.	59	10	1.9	8	0.6	23	1.2	1.3
West Newton, Pa.	15	23	0.8	7	0.0	22	0.4	0.8
Muskingum River.								
Zanesville, Ohio	70	20	8.0	1	6.6	19,21	7.1	1.4
Tennessee River.								
Knoxville, Tenn.	614	29	......	......	......	......	......	......
Kingston, Tenn	534	25	13.0	4	0.9	21,22	3.4	12.1
Chattanooga, Tenn.	430	33	24.6	5	3.5	21,22	7.6	21.5
Bridgeport, Ala	390	24	18.2	6	1.8	22	5.3	16.4
Florence, Ala	230	16	12.8	8	1.8	4,24	4.5	11.0
Johnsonville, Tenn.	94	21	16.5	10	2.8	6	6.1	13.7
Clinch River.								
Speers Ferry, Va.	156	20	0.9	5	−0.5	21,30	0.1	1.4
Clinton, Tenn	46	25	7.0	3	2.8	21	4.1	4.2
Wabash River.								
Mount Carmel, Ill	50	15	5.8	29	1.3	4,5	2.3	4.5
Red River.								
Arthur City, Tex.	688	27	5.8	2	4.5	23-30	4.9	1.3
Fulton, Ark	565	28	13.3	16	3.2	30	5.3	10.1
Shreveport, La.	449	29	7.3	19	1.8	10	3.3	5.5
Alexandria, La	139	33	4.3	24	−0.3	20	1.2	4.6
Atchafalaya Bayou.								
Melville, La	100*	31	21.3	1	9.5	18	14.0	11.8
Ouachita River.								
Camden, Ark.	340	39	5.2	19	3.2	12-14	4.1	2.0
Monroe, La	100	40	4.2	30	0.8	13-15	1.7	3.4
Yazoo River.								
Yazoo City, Miss.	80	25	1.1	1	−0.3	17	0.3	1.4
Chattahoochee River.								
Columbus, Ga.	140	20	25.6	7	2.1	29,30	6.5	23.5
Flint River.								
Albany, Ga.	80	20	17.2	2	0.8	30	7.3	16.4
Cape Fear River.								
Fayetteville, N. C	100	38	18.8	6	2.2	22	7.5	16.6
Columbia River.								
Umatilla, Oreg	270	25	8.3	1	4.2	27-30	5.8	4.1
The Dalles, Oreg	166	40	12.3	1	5.8	24-26	8.0	6.5
Willamette River.								
Albany, Oreg	99	20	1.5	27,28	0.7	1-19	0.8	0.8
Portland, Oreg	10	15	5.7	3	2.2	25	3.7	3.5
Edisto River.								
Edisto, S. C	75	6	5.9	12,13	2.7	28-30	4.6	3.2
James River.								
Lynchburg, Va.	257	18	3.0	23	−0.2	18,21,22	0.5	3.2
Richmond, Va.	110	12	1.6	25	−0.2	14-18,23	0.1	1.8
Alabama River.								
Montgomery, Ala	265	35	16.6	10	1.5	22-24	5.9	15.1
Selma, Ala	212	35	18.0	11	1.6	23,24	7.2	16.4
Coosa River.								
Rome, Ga.	225	30	24.3	4	2.0	1	6.9	22.3
Gadsden, Ala	144	18	17.3	8	1.0	2,30	6.1	16.3
Tombigbee River.								
Columbus, Miss.	285	33	0.8	23	−3.7	19,20	−2.8	4.5
Demopolis, Ala.	155	35	3.7	25	−3.0	20,21	−1.2	6.7
Black Warrior River.								
Tuscaloosa, Ala.	90	38	1.2	1	−0.9	21,26,27	−0.3	2.1
Pedee River.								
Cheraw, S. C.	145	27	27.5	26	0.5	22,23	5.9	27.0

Heights of rivers referred to zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Black River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Kingstree, S. C.	60	12	9.9	7	3.4	30	7.0	6.5
Lumber River.								
Fairbluff, N. C.	10	6	5.2	3-7	1.2	28	3.9	4.0
Lynch Creek.								
Effingham, S. C.	35	12	13.4	7,8	4.1	20	8.6	9.3
Potomac River.								
Harpers Ferry, W. Va.	170	16	2.0	1, 2, 6, 7	0.5	30	1.3	1.5
Roanoke River.								
Clarksville, Va.	155	12	10.4	25	0.0	19-22	1.6	10.4
Sacramento River.								
Red Bluff, Cal.	241	23	−0.6	16, 26, 27	−0.8	1-14	−0.8	0.2
Sacramento, Cal.	70	25	7.5	28-30	7.1	13-21	7.2	0.4
Santee River.								
St. Stephens, S. C.	50	12	8.7	3-7	4.2	25	7.8	8.5
Congaree River.								
Columbia, S. C.	37	15	10.2	25	0.4	21	2.1	9.8

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height	Date.	Height.	Date.		
Wateree River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Camden, S. C.	45	24	26.9	25	3.1	23	9.3	23.8
Savannah River.								
Augusta, Ga.	130	32	28.4	2,3	7.1	19	13.0	21.3
Susquehanna River.								
Wilkesbarre, Pa.	178	14	6.0	1	0.0	26-30	1.9	6.0
Harrisburg, Pa.	70	17	3.0	3	0.8	24-26, 29, 30	1.6	2.2
Juniata River.								
Huntingdon, Pa.	80	24	3.3	27	2.8	15-26, 30	2.9	0.5
W. Br. of Susquehanna.								
Williamsport, Pa.	35	20	1.1	1	0.4	19, 21, 23-25	0.6	0.7
Waccamaw River.								
Conway, S. C.	40	7	4.9	3,4	3.0	28-30	4.2	1.9

*Distance to Gulf of Mexico.

THE WEATHER OF THE MONTH.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

The statistical aspects of the weather of the month are presented in the tables which form the closing part of this REVIEW. Table I, in particular, contains numerous details that are important in the study of climatology. The numerical values in the tables have been generalized in a number of cases, the results appearing on Charts Nos. III to VII, inclusive.

PRESSURE AND WIND.

Normal conditions.—The geographic distribution of normal barometric readings at sea level and under local gravity for September is shown by Chart V of the MONTHLY WEATHER REVIEW for September, 1893.

Normal pressure in September is highest (30.10) on the Virginia coast, whence it decreases westward to the Mississippi Valley (30.05), and the Plains region (30.00). It is also high (30.00) on the north Pacific coast. Normal pressure is lowest (29.90) in the lower Colorado and upper Saskatchewan valleys.

As compared with August there is generally an increase of pressure in all regions save the extreme north Pacific coast and over the southern part of the Florida Peninsula. The greatest increase, 0.5 inch and over, occurs from New England and the Middle Atlantic States westward to the Mississippi Valley and over the northern Rocky Mountain and Plateau regions. The pressure changes of September mark the beginning of the return of winter conditions, viz, a building up of the South Atlantic and Plateau highs and a general increase of pressure over all sections.

In September the winds of the South Atlantic coast States are northeasterly and easterly, and there is also a marked eastward tendency noticeable south of the thirty-seventh parallel and westward to the Plateau region. In Texas and elsewhere on the Plains southeasterly winds prevail as in the preceding month. The winds of New England are offshore as a rule. Southerly winds prevail in the middle and upper Mississippi Valley, becoming southwesterly in the Lake Region. The winds of the upper Missouri Valley are generally from a northerly or westerly quarter, those of the Plateau and Rocky Mountain regions are westerly, except in cases largely controlled by local conditions.

The current month.—The distribution of monthly mean pressure is shown on Chart IV. The configuration of the isobars corresponds closely with normal conditions except possibly in the Rocky Mountain region.

Pressure was below normal in almost all parts of the country, the only notable exception being over the southern half of Virginia, the Carolinas, and the northeastern corner of Florida. The greatest departure from normal conditions (.05 to .10 inch) occurred over a strip of territory extending from Texas to the Saskatchewan Valley and eastward from the upper lakes to St. Johns, N. F.

The distinguishing features of the month, as regards atmospheric pressure, was the relatively large number of disturbances having their origin on the southern Slope, Texas, or the west Gulf.

The character of September weather in the Gulf and South Atlantic States, whether warm and dry or broken by periods of wet and relatively cool weather, is largely dependent upon the origin and movement of atmospheric disturbances. In September, 1895 and 1896, no storm was generated in the west Gulf, Texas, or the southern Slope; the weather was accordingly warm and dry. During the current month several disturbances appeared in the Gulf, one of which remained in approximately the same position for about seventy-two hours before beginning to move inland, giving, in the meantime, cloudy weather and abundant rains on the coast.

The heavy rainfall on the immediate Gulf coast, particularly the western portion of it, is largely due to disturbances of this class.

TEMPERATURE OF THE AIR.

Normal conditions.—The normal temperature of the air in the United States in September varies from about 82° at Key West, 78° at Jacksonville, 78° at New Orleans, 80° at Galveston, 67° at San Diego, to 56° at Eastport, 62° at Burlington, 62° at Buffalo, 63° at Detroit, 56° at Duluth, 53° at St. Vincent, 55° at Havre, 58° at Spokane, and 57° at Seattle, on Puget Sound. The warmest regions are the lower Rio Grande Valley and southwestern Arizona, including a portion of the desert region of California; the coolest, the mountainous portions of Montana and Idaho and the north Pacific coast. The seacoast is cooler than the interior on corresponding parallels.

In studying the distribution of monthly mean temperatures it will be found very helpful to consult the charts at the end of this REVIEW, especially No. VI, Surface Temperatures, Maximum, Minimum, and Mean. This chart gives a very good idea of the variations of temperature with latitude

and longitude, and also of the distribution of normal surface temperatures. Chart VI for any month will differ from a normal chart merely in the displacement or bending of the isotherms northward or southward according as the temperature of the particular locality is above or below the normal for the place and season.

The current month.—The month opened with a period of extremely warm weather for the season, the abnormal conditions extending from the lower Lake region to the Atlantic coast. The crest of the warm wave was reached on the 3d, but the temperature remained high several days thereafter. A cool wave set in over the Rocky Mountain region on the evening of the 5th, and gradually extended eastward and southward, reaching the Gulf and Atlantic coasts by the morning of the 8th. Relatively low temperatures prevailed in the central valleys and the States of the Atlantic seaboard until about the 14th, after which date the temperature rose to above normal, remaining so, excepting for a brief interval about the 21st, until the end of the month.

The average temperatures of the respective geographic districts, the departures from the normal of the current month and from the general mean since the first of the year, are presented in the table below for convenience of reference:

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	63.6	+ 2.3	+12.1	+ 1.3
Middle Atlantic	12	69.7	+ 2.7	+15.4	+ 1.7
South Atlantic	10	76.2	+ 2.2	+ 9.4	+ 1.0
Florida Peninsula	7	80.7	+ 1.7	+ 4.3	+ 0.5
East Gulf	7	77.7	+ 1.3	+ 5.3	+ 0.6
West Gulf	7	78.1	+ 2.1	+13.6	+ 1.5
Ohio Valley and Tennessee	12	72.4	+ 3.9	+18.6	+ 2.1
Lower Lake	8	66.8	+ 3.7	+25.6	+ 2.8
Upper Lake	9	63.1	+ 3.8	+25.3	+ 2.8
North Dakota	7	57.2	+ 1.0	+23.8	+ 2.6
Upper Mississippi	11	68.5	+ 3.5	+21.6	+ 2.4
Missouri Valley	10	68.0	+ 2.5	+23.5	+ 2.6
Northern Slope	7	58.6	+ 0.5	+10.6	+ 1.2
Middle Slope	6	68.0	+ 0.6	+11.3	+ 1.3
Southern Slope	5	71.9	− 0.1	+ 5.8	+ 0.6
Southern Plateau	13	72.6	+ 1.2	+ 1.1	+ 0.1
Middle Plateau	9	62.3	+ 0.6	− 3.4	− 0.4
Northern Plateau	11	59.6	+ 0.7	+ 8.7	+ 1.0
North Pacific	9	58.7	+ 1.7	+ 9.3	+ 1.0
Middle Pacific	5	62.2	− 0.9	− 5.9	− 0.7
South Pacific	4	69.3	+ 0.9	+ 3.3	+ 0.4

Maximum temperatures of 100° and over were observed on both sides of the Rocky Mountains. On the eastern side the region of high maxima included the central portion of South Dakota, and a rather narrow strip extending from southern Nebraska almost in a direct line to the Rio Grande Valley. West of the mountains temperatures of 100° and over were observed in California and Arizona.

Minimum temperatures below 32° occurred quite frequently in the Rocky Mountain and Plateau regions, as also in the Dakotas and northern Minnesota. The lowest temperature at any regular Weather Bureau station was 26°; at any voluntary station, 8°, viz, at Lake Morain, Colo., on the 12th.

The month as a whole was warmer than usual, especially in the upper Mississippi valley and the Middle Atlantic States.

Deaths and prostrations, due to the excessive heat of the first few days of the month, occurred in the larger cities of the Lake region and Middle Atlantic States.

The distribution of the observed monthly mean temperature of the air is shown by red lines (isotherms) on Chart VI. This chart also shows the maximum and the minimum temperatures, the former by black and the latter by dotted lines. As will be noticed, these lines have been drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level; the isotherms relate, therefore, to the average surface of the country in the neighborhood of the various observers, and as such must differ greatly from the sea-level isotherms of Chart IV.

In Canada.—Prof. R. F. Stupart says:

> Temperature was average, to slightly below, in Eastern Quebec and the extreme northeastern portion of New Brunswick, but everywhere else in the Dominion it was above average, the excess being particularly marked throughout British Columbia and also from Manitoba east to the Ottawa River, the amount above average being as much as 6° in many portions of Ontario.

FROST.

Killing frost occurred quite generally in the Rocky Mountain region and the more northern States from the 6th to the 11th, and at elevated points in a number of other States. Frost occurred at one or more stations in the States and on the dates named below: Arizona, 10, 11, 12; California, 21; Colorado, 3–14, 17, 29, 30; Connecticut, 20, 21; Idaho, 1–13, 15, 16, 17, 22, 23, 24, 27–30; Iowa, 1, 29, 30; Kansas, 7, 11; Maine, 11, 12, 13, 20, 24, 25; Maryland, 12, 29; Massachusetts, 3, 21; Michigan, 8–12, 19, 20, 25, 26; Minnesota, 1, 7–11, 19, 20, 25, 27–30; Montana, 5–12, 27, 29, 30; Nebraska, 5–14, 30; Nevada, 1–15, 25, 26, 28, 29, 30; New Hampshire, 13, 21, 22, 28; New Jersey, 23; New Mexico, 4, 5, 11, 12, 13; New York, 11, 13, 21; North Dakota, 7–12, 15, 19, 29, 30; Ohio, 11; Oregon, 22, 23, 27–30; Pennsylvania, 11, 20, 21, 28; South Dakota, 5–11, 16, 27, 29, 30; Utah, 2–8, 10–13, 15, 17, 18, 24, 25, 29, 30; Vermont, 11, 12, 13, 18, 20, 21, 22; Washington, 27–30; Wisconsin, 9–12, 20, 26, 27, 28, 30; Wyoming, 3–12, 16, 21, 23.

PRECIPITATION.

Normal conditions.—Heavy precipitation in September (4 to 6 inches and over) occurs on the Florida and Gulf coasts, and on portions of the South Atlantic coast. The normal precipitation in parts of New Jersey, northern Michigan, and in the upper Mississippi valley, approaches closely to 4 inches. Elsewhere east of the ninety-fifth meridian it varies from 2 to 3 inches. The rainfall of the Rocky Mountain and Plateau regions and the Pacific coast in general is small in amount and quite variable.

Current month.—The rainfall of the month was not well distributed, being excessive in many localities and greatly deficient in adjacent sections. Very heavy rains fell on the southern extremity of the Appalachian range, the total amounts varying from 8 to 12 inches. Immediately to the southward, in Georgia and Alabama, the total fall for the month was barely 2 inches, several stations reporting less than an inch. On the west coast of Florida and in southern Alabama, Mississippi, and Louisiana the fall was very heavy, aggregating from 8 to 18 inches. Heavy falls also occurred over other areas, viz, in Arkansas, Missouri, and Kansas.

In California the rainy season began on the 28th, quite a heavy rain falling in the southern half of the Great Valley and part of the foothills region. In a few localities the fall ranged from 1.5 to 2 inches—a very large amount for the initial rain of the season. Whatever damage was done to the fruit crop by the early rain was offset by the relief it afforded irrigation systems and the water supply of the State in general.

DESERT RAINS IN AUGUST.

Very heavy rains occurred over the desert region of San Bernardino County, Cal., during the closing days of August. No rain gauges were in the path of the storms and we are therefore unable to give definite measurements. The storms seem to have extended from Barstow, in San Bernardino County, Cal., eastward into northwestern Arizona, a distance

of about 200 miles. The San Bernardino Sun has the following interesting article concerning desert rains.

With the end of the hot wave comes the beginning of the rainy season, and although the rain has not reached the valleys as yet, it has commenced on the mountains and desert in a manner that gives promise of plenty of rain the coming season, if signs go for anything.

There have been a few showers along the mountain range before this; in fact over an inch of rain fell a few days since at Bear Valley Lake, but Saturday last commenced the real downpour for the mountain range and the desert.

Parties who came down from Bear Valley last night report that the rain was very heavy Saturday night [August 27] and most of the day Sunday. So much rain has fallen that the upper Bear Valley reservoir or lake is filled almost to its fullest capacity. This is a remarkable occurrence, considering the very low stage of the water all the past summer. This will be a present help to the supply of water for irrigation and power from that source as well as a good promise for the future.

On the Mojave desert the washout on the railroad has been very heavy since Saturday night and Sunday. Miles and miles of track have been washed away, and at places the destruction was so complete the washed out material of track and ties could not be found, but entirely new material had to be furnished for the repairs. Enormous quantities of rain have fallen, giving the whole desert such a soaking as it has been a stranger to for months.

In the Cajon Pass the damage was considerable from the heavy downpour and from the consequent landslides of the clayey soil. There were no trains between this city and the Needles for two days until the arrival of the overland that rolled in at 5:30 yesterday afternoon.

These heavy downpours of rain in this vicinity have been duplicated in Arizona and on the Colorado desert, washing out the track of the Southern Pacific, delaying trains for several days at a time. The rains have also reached far down into Mexico, and those who have watched the rain signs of former years predict from these rains a very wet winter and plenty of water.

It has been stated by civil engineers who claim to be experts that rainfalls on the mountains would not affect the wells of the valley for months or a year or two, as the water percolated very slowly through the ground. The present rain has already refuted this theory, for within two days after the rain on the mountains the artesian wells in the city gave sign of feeling the pressure and began a slightly better flow. It is evident the water from the artesian belt has reached the lowest point of the year, and from now on will begin to flow more freely.

CYCLONIC RAINS IN THE GULF STATES.

The heavy rains on the Gulf coast and the eastern flank of the Appalachians in North Carolina, bring to mind some of the conditions that produce excessive rains.

The rains of the Gulf coast are purely cyclonic, that is to say, they belong to a class of rains that are caused by the ascensional movement and consequent cooling of highly saturated air of relatively high temperature in cyclonic systems.

In the absence of cyclonic storms the rainfall of the Gulf coast is comparatively light; thus, in 1895, there being no such storms within a distance of 500 miles of the coast line, the following amounts were recorded: Pensacola, 1.41 inch, or 29 per cent of the normal; Mobile, 1.68, or 33 per cent; Port Eads, 2.06, or 34 per cent; New Orleans, 1.97, or 43 per cent; Galveston, 1.86, or 30 per cent. If now, we set against these amounts which may be considered as representing the lower limit, the amounts recorded during the current month when the conditions were most favorable for heavy precipitation, we have at once an approximate measure of the variability of September rainfall on the Gulf coast.

The amounts for the current month are as follows: Pensacola, 17.93 inches, or 373 per cent of the normal; Mobile, 16.40, 317 per cent; Port Eads, 18.44, 307 per cent; New Orleans, 13.90, 303 per cent; Galveston, 6.78, 109 per cent.

HEAVY RAIN IN NORTH CAROLINA.

The heavy rain on the eastern slope of the Appalachians in North Carolina, was doubtless due to the joint effect of the pressure distribution and the mountain ranges.

Mr. C. F. von Herrmann, Section Director, North Carolina Climate and Crop Service, in his September report gives an

account in some detail of the heavy rain of the 22d in western North Carolina from which the following is condensed:

The crest of the Blue Ridge, the highest land east of the Rocky Mountains, extends in a curved line from the northwest corner of Surry County to the southwest corner of Polk, with a considerable bend or deflection to the west, about the middle of the straight line joining the two points above mentioned. On the morning of the day during which the heaviest rain fell, the wind was from the northeast in Stokes County (Saxon) at the north end of the crest, and southeast in Polk County (Skyuka) at the south end, so that the Blue Ridge formed a trap into which the air was blown with considerable force, to escape from which it was deflected upward over the crest of the mountains. The downpour of water resulting during the short space of less than twenty-four hours was exceptionally heavy over all the counties immediately east of the Blue Ridge, in order from south to north: Polk, Rutherford, McDowell, Burke, Caldwell, Wilkes, and Surry. There was a rapid diminution in the amount of precipitation both east and west of the crest, though unquestionably the air over eastern North Carolina must have been nearly saturated with moisture, but the ascensional tendency was absent except in the west. This is indicated by the comparatively small rainfall at Charlotte (1.82 inches), Mocksville (1.53), Saxon (3.88), and less farther east, and on the west side of the mountains Waynesville had only 1.70, Asheville 2.72, and Knoxville 1.08 inches for the entire storm.

The following amounts were recorded on the immediate eastern slope, and the direction of the wind as noted by voluntary observers is also given: Saxon, Stokes County, 3.88 inches, wind northeast; Mountairy, Surry, 6.02; Abshears, Wilkes, 7.01, wind east; Patterson, Caldwell, 8.00, wind east; Lenoir, Caldwell, 6.00, wind southeast; Linville, Mitchell (on crest), 7.57, wind southeast; Marion, McDowell, 6.78, wind east; Morgantown, Burke, 4.77; Skyuka, Polk, 5.61, wind southeast; Flatrock, Henderson (near crest), 5.75 inches.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	10	1.89	59	−1.30	+ 2.10
Middle Atlantic	12	2.34	61	−1.50	− 2.80
South Atlantic	10	3.13	59	−2.20	− 3.30
Florida Peninsula	7	4.24	53	−3.80	−10.60
East Gulf	7	11.87	265	+7.40	− 1.40
West Gulf	7	4.71	117	+0.70	− 2.90
Ohio Valley and Tennessee	12	3.88	130	+0.90	+ 1.20
Lower Lake	8	2.89	100	0.00	− 0.80
Upper Lake	9	2.62	77	−0.80	− 1.50
North Dakota	7	1.36	100	0.00	− 1.50
Upper Mississippi	11	4.05	128	+0.90	+ 4.50
Missouri Valley	10	3.07	119	+0.50	+ 3.20
Northern Slope	7	1.07	110	+0.10	− 0.50
Middle Slope	6	1.77	100	0.00	+ 2.30
Southern Slope	6	1.55	66	−0.80	− 1.70
Southern Plateau	13	0.17	20	−0.70	− 1.80
Middle Plateau	9	0.13	18	−0.60	− 1.70
Northern Plateau	11	0.55	65	−0.30	− 2.70
North Pacific	9	3.59	113	+0.40	− 5.40
Middle Pacific	5	0.83	114	+0.10	− 3.10
South Pacific	4	0.35	233	+0.20	− 4.90

The geographic distribution of precipitation is shown on Chart III, and the numerical values for about 3,000 stations appear in Tables II and III, while the details as to excessive rains will be found in Table XI.

In Canada.—Prof. R. F. Stupart says:

The rainfall was below average from Vancouver Island across the Rockies to a line drawn north and south from Prince Albert; below in eastern Quebec and the extreme eastern portions of the Maritime Provinces, and also below in that part of Ontario contained in the country from the Georgian Bay and Lake Huron south to Lake Erie, and east to about the extreme western margin of Lakes Simcoe and Ontario.

The greatest deficiency occurred at Parry Sound, 1.3 inch below average, and the greatest general deficiency was in Alberta, from 0.4 to 0.8 inch. In all other portions of Canada the rainfall was above average; this was especially the case at Montreal, where the amount was exceeded by 3.1 inches, at Port Arthur by 2.2 inches, and at Qu'Appelle by 2.3 inches. Locally, in the Niagara Peninsula the rainfall was much in excess of average, particularly so at Welland, where the total rainfall amounted to 5.1 inches, or 1.6 above average.

SEVERE HAILSTORMS.

The following account of severe hailstorms has been compiled from press dispatches, reports of Climate and Crop section directors, and the statements of regular and voluntary observers:

5th. An extraordinary hailstorm swept over northwestern Missouri on the afternoon of the 5th, an account of which appears on subsequent pages of this REVIEW.

14th. A hailstorm, described in the local press as terrific, struck Cape Girardeau, Mo., at 1:45 p. m., lasting fifteen minutes. The hailstones varied in size from that of a marble to a hen's egg. The deluge of hail stopped all traffic, demolished window panes on the western side of buildings, denuded trees of fruit and foliage, and covered the ground to a depth of 3 or 4 inches with a mass of icy hailstones. Churches and school buildings suffered the greatest damage, the loss in glass alone in extreme cases reaching from $75 to $100.

26th. Heavy hail fell over the Niagara Peninsula in connection with a tornado that occurred in the afternoon. The hail fell principally outside of the tornado track.

The following are the dates on which hail fell in the respective States:

Arizona, 10. Arkansas, 10. California, 30. Colorado, 9, 10. Connecticut, 7. Delaware, 26. Illinois, 5, 6, 15, 25, 27. Indiana, 5, 6, 15, 16, 24, 30. Iowa, 4, 5, 9. Kansas, 4, 5, 6, 9, 11, 16, 17. Kentucky, 15, 26, 27. Maryland, 26. Massachusetts, 1, 2, 17. Michigan, 14, 15, 24. Minnesota, 29. Missouri, 4, 5, 6, 12, 14, 15, 16, 17, 21, 23, 25, 30. Montana, 2, 3, 5, 22. Nebraska, 2, 4, 5, 12. Nevada, 28, 30. New Hampshire, 20. New Jersey, 7, 26. New Mexico, 10, 16. New York, 2. North Dakota, 8, 24. Ohio, 6, 24, 25, 26, 29. Oklahoma, 16. Oregon, 22, 28, 29, 30. Pennsylvania, 4, 17, 26, 27. Tennessee, 21. Washington, 18, 22, 29. West Virginia, 4, 26. Wisconsin, 14, 23. Wyoming, 3, 22.

Hail was reported on the greatest number of dates, in Missouri, 12; Kansas, 7.

SLEET.

The following are the dates on which sleet fell in the respective States:

California, 30. Colorado, 9, 10, 13. Michigan, 9. New Mexico, 10.

HUMIDITY.

The humidity observations of the Weather Bureau are divided into two series; the first or tridaily series began in 1871 and ended with 1887; the second or twice-daily series is continuous from 1888 to the present time.

The monthly means of the second or present series are based upon observations of the whirled psychrometer at 8 a. m. and 8 p. m., seventy-fifth meridian time, which corresponds to 5 a. m. and 5 p. m., Pacific; 6 a. m. and 6 p. m., Mountain; and 7 a. m. and 7 p. m., Central standard time.

Mean values computed from the first series are naturally not directly comparable with those of the second. In general the means of the first series are lower than those of the second, since they include an observation in the afternoon when the relative humidity of the air is near the minimum of the day. At stations in the western plateau region, however, the converse holds good, the means of the second series being lower than those of the first by amounts ranging from 0 to 10 per cent on the average of the year.

In the present state of knowledge respecting the diurnal variation in the moisture of the air, we are scarcely warranted in combining the two series in a general mean.

The current month.—The month was relatively dry in the majority of districts, the notable exceptions being the Gulf States, the Ohio Valley and Tennessee, the upper Mississippi Valley and the Middle Slope. It would seem that there should be some simple relation between the rainfall on the one hand and the cloudiness and relative humidity on the other; thus an excess of rain would imply, in general, more than the average amount of clouds and a higher percentage of relative humidity than obtains under ordinary conditions. That such a relation does not always exist may be seen by an examination of the three tables in this section giving, respectively, the averages of rainfall, humidity, and cloudiness, for the various geographic districts. (See, for example, the North Pacific for the current month.)

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	81	−1	Missouri Valley	65	−2
Middle Atlantic	76	−1	Northern Slope	51	−2
South Atlantic	82	−1	Middle Slope	60	+2
Florida Peninsula	81	−1	Southern Slope	58	−4
East Gulf	82	+5	Southern Plateau	38	−9
West Gulf	79	+5	Middle Plateau	31	−6
Ohio Valley and Tennessee	77	+4	Northern Plateau	52	0
Lower Lake	73	−1	North Pacific Coast	76	−5
Upper Lake	77	−1	Middle Pacific Coast	66	−2
North Dakota	64	−1	South Pacific Coast	64	−1
Upper Mississippi Valley	75	+3			

In using the table by means of which the amount of moisture in the air is computed from the readings of the wet and dry bulb thermometers, the pressure argument has almost always been neglected, an omission that has little significance except for low temperatures and at high stations, such as Santa Fe, El Paso, Cheyenne, and a few others. The failure to apply a correction for the influence of pressure on the evaporation and therefore on the temperature of the wet-bulb thermometer has had the effect of making the monthly means of relative humidity at high-level stations too small by quantities ranging from 5 to 10 per cent. In the application of the monthly averages of the above table, or those of individual stations in Table I, to special inquiries, whether in the departments of biology, climatology, or sanitary science, this fact should be kept in mind. It should also be remembered that the hours at which observations in the Rocky Mountain Plateau region are made, viz, at 5 or 6 local mean time, morning and afternoon, give approximately the maximum and minimum values of the relative humidity for the day; probably the means of such hours approach more nearly the true mean of the month than is the case on the Atlantic seaboard and in the seventy-fifth meridian time belt.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 21 regular stations of the Weather Bureau by its photographic and at 47 by its thermal effects. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table IX for each hour of local mean time. In order to complete the record of the duration of cloudiness these

registers are supplemented by special personal observations of the state of the sky near the sun for an hour after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table IX for the stations at which instrumental self-registers are maintained.

The percentage of clear sky (sunshine) for all of the stations included in Table I, obtained as described in the preceding paragraph, is graphically shown on Chart VII. The regions of cloudy and overcast skies are shown by heavy shading; an absence of shading indicates, of course, the prevalence of clear, sunshiny weather.

The formation of fog and cloud is primarily due to differences of temperature in a relatively thin layer of air next to the earth's surface. The relative position of land and water surfaces often greatly increases the tendency to form areas of cloud and fog. This principle is perhaps better exemplified in the Lake region than elsewhere, although it is of quite general application. The percentage of sunshine on the lee shores of the Lakes is always much less than on the windward shores. Next to the permanent influences that tend to form fog and cloud may be classed the frequency of the passage of cyclonic areas.

The current month.—The geographic distribution of sunshine and, conversely, of cloudiness, is shown on Chart VII. In general there was less cloudiness and consequently more than the usual amount of sunshine, the only notable exceptions being in the east Gulf and middle Pacifiic coast.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	4.5	—0.5	Missouri Valley	3.9	—0.1
Middle Atlantic	3.8	—1.0	Northern Slope	3.7	—0.3
South Atlantic	4.8	0.0	Middle Slope	3.2	0.0
Florida Peninsula	4.3	—1.2	Southern Slope	3.2	—0.4
East Gulf	5.8	+1.4	Southern Plateau	1.4	—0.9
West Gulf	4.3	0.0	Middle Plateau	2.6	+0.1
Ohio Valley and Tennessee	4.3	—0.1	Northern Plateau	3.0	—1.1
Lower Lake	4.4	—0.4	North Pacific Coast	5.2	+0.3
Upper Lake	4.7	—0.4	Middle Pacific Coast	3.8	+1.0
North Dakota	4.1	—0.2	South Pacific Coast	2.0	—0.5
Upper Mississippi Valley	4.3	+0.1			

FOREST FIRES.

July.—Numerous forest fires were reported throughout California during the latter part of July and the 1st of August, the most destructive of which occurred in Shasta, Madera, Lake, Calaveras, Santa Cruz, Sacramento, Los Angeles, Monterey, San Joaquin, Eldorado, Placer, and Amador counties.

The forest areas of the State were generally in a very dry condition owing to the almost complete failure of the winter rains, and the progress of the fires was naturally exceedingly rapid.

August.—The July conflagration in Los Angeles County covered an area of 20 square miles, approximately. Fresh fires broke out during the middle of August and raged for about a week, devastating a territory about twice as large as covered by the July fires, but mainly on the north side of the ranges.

While no loss of life occurred, almost irreparable damage was done to the trees and forest covering on the headwaters of the San Gabriel and other small mountain streams.

September.—The most serious forest fires in the history of Colorado developed in the western counties of the State during the closing days of the month. On September 30, vast tracts of timber had been burned and fires were raging at many places, particularly in the northwestern part of the State.

Some persons ascribed the origin of the fires to the dry and parched condition of the country, little rain having fallen since April; others to the carelessness of hunters in camp, while still others believe them to have been of incendiary origin. Whatever the cause, the timber interests of the State have suffered very greatly, not only in the loss of valuable timber, but more especially in the destruction of hundreds of acres of forest covering so necessary to the conservation of the water that falls on the mountains.

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Bismarck, N. Dak	3	50	nw.	New York, N. Y	7	72	sw.
Block Island, R. I	24	55	ne.	Sioux City, Iowa	29	50	s.
Dodge, Kans	16	55	nw.	Toledo, Ohio	24	60	s.
Fort Canby, Wash	20	58	se.	Williston, N. Dak	28	50	nw.
Do	21	60	se.	Basseterre, St. Kitts	12	54	s.
Do	28	60	se.	Bridgetown, Barbados	10	62	ne.
Independence, Cal	30	52	nw.				

LOCAL STORMS AND TORNADOES.

6th.—On the afternoon of this date tornadic activity prevailed over two parallel bands in New York State and Pennsylvania; the first or westernmost extended from the southeastern portion of Wyoming County, N. Y., in a northeasterly direction, to near Phelps, in the northeastern part of Ontario County, of the same State. Three funnel clouds were observed. The first was seen near Nunda, at 1 p. m., eastern time, passing thence northeasterly for a distance of about 10 miles, wrecking farm buildings and fences at intervals in its course. No loss of life; property loss about $5,000. The second funnel cloud was observed at Greigsville, in Livingston County, at 4 p. m., eastern time. In its course of 6 or 7 miles it wrecked 6 buildings involving a property loss of $2,500; path 20 to 25 rods wide; moved northeast. The third storm was most violent near Geneva, Ontario County. One life was lost, several persons were injured, farm buildings were unroofed and in some cases completely wrecked, involving a loss of about $5,000.

The second group of tornadoes had its origin in Bradford County, Pa., about 100 miles to the southeast of the first. First was observed near Columbia Cross Roads at 5:30 p. m., eastern time. Two persons were killed and 1 injured; path of great destruction 2 miles long and about 10 rods wide; property loss $3,000; moved east. About an hour later a second tornado cloud struck the earth in the vicinity of East Masonville, Delaware County, N. Y., continuing in a northeasterly direction for some distance as a severe storm of wind and rain. One person was killed and 4 injured, where the tornado first touched the earth; the property loss was about $2,500.

7th.—A severe storm, having some of the characteristics

of a tornado, passed over Elizabeth, N. J., at 3:20 p. m., eastern time. No casualties; property loss caused principally by the unroofing of buildings and the subsequent drenching of the contents, amounted to $10,000. Evidently the tornado cloud was not fully developed or the damage would have been much greater.

18th.—A wind storm of sufficient strength to unroof buildings and prostrate trees, passed through a portion of Genesee County, N. Y., about 4 p. m., eastern time.

24th.—A severe storm, generally believed to have been a tornado, visited Lima, Ohio, about 2 p. m., central time. It is said that two funnel clouds united over the northeastern part of the town. The damage to property was very great, probably $100,000. No lives were lost although about 20 persons were more or less injured.

26th.—A severe tornado, having its origin on Lake Ontario, swept across the Niagara Peninsula in a path about 300 feet wide, crossed the Niagara River at Tonawanda and disappeared only to reappear in a less destructive form in the southeastern part of Erie County. It crossed into Genesee county north of Alden and was last observed at Darien at a distance of 45 miles in an air line from the point of origin. The funnel cloud was first observed on Lake Ontario. Accounts differ as to the time in passed St. Catherines, Ont.; one account gives the time as 2:30 p. m., another 3:25 p. m., and a third as 3:45 p. m. It crossed the Niagara River at Grand Island and struck Tonawanda between 4:30 and 5:00 p. m.

At Alden in Erie County as many as three funnel clouds were observed, none of which endured for any length of time. The observer at the last-named place reports an exceedingly rapid rate of movement, probably 60 miles per hour. Five persons were killed as Merritton and vicinity, and probably 18 or 20 injured throughout the course of the storm. The property loss was large, estimated as $100,000 at St. Catherines, $200,000 at Merritton, and $70,000 at Tonawanda, total $370,000. The path of the tornado was exceedingly narrow, not over 300 feet. Large hail fell on the outer edges. The barograph at the Buffalo Weather Bureau office, 4 miles distant from the funnel cloud, did not show any marked disturbance at the time of the passage of the tornado. The curve for the afternoon forms a very open V, the rise in pressure occurring at the time of passage of the tornado. The maximum velocity of the wind was 42 miles per hour from the west at 5:05 p. m.

29th.—A severe local wind demolished a building in the suburbs of Louisville, Ky., killing 1 person, the only occupant. Loss to building about $2,000.

WATERSPOUT.

Bay St. Louis, Miss., September 29, at 6:50 p. m. a beautiful waterspout formed a short distance from shore, and went in a westerly direction, increasing in strength. It was followed by a heavy rain for one hour. One house destroyed, two unroofed, and another lifted from pillars.—*Report of voluntary observer.*

ATMOSPHERIC ELECTRICITY.

Thunderstorms.—Two thousand six hundred and ninety-six reports of thunderstorms were received during the current month as against 1,732 in 1897, and 4,853 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 4th, 328; 5th, 210; 6th, 208; 2d, 193; 7th, 163.

Reports were most numerous from Ohio, 243; Illinois, 215; New York, 169; Missouri, 153.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from 1st to 4th, and 25th to 30th.

The greatest number of reports were received for the following dates: 9th, 62; 2d, 59; 10th, 28; 11th, 21.

Reports were most numerous from Wisconsin, 32; North Dakota, 19; Minnesota, 17; Michigan, New Hampshire, and New York, 16.

In Canada.—Auroras were reported as follows: Yarmouth, 6, 9; Charlottetown, 9; Father Point, 9, 12, 16, 24, 28; Quebec, 9, 10, 13, 16, 20, 28; Toronto, 2; White River, 11; Kingston, 2, 3, 16; Port Stanley, 2; Port Arthur, 17; Winnipeg, 11, 13, 29; Banff, 6, 9, 10, 14; Minnedosa, 8, 10, 11, 14, 15, 29; Qu'Appelle, 11, 12, 14; Kamloops, 9; Battleford, 23; Barkerville, 2.

Thunderstorms were reported as follows: Grand Manan, 5; Bermuda, 11, 13, 14, 17, 18, 19, 22, 26, 28; Yarmouth, 3; Charlottetown, 5; Father Point, 4, 10; Quebec, 4, 9, 18, 26, 30; Montreal, 1, 2, 4, 9, 18, 19, 30; Toronto, 3, 18, 26; White River, 2, 3, 18, 21, 29; Kingston, 1, 2, 5, 18; Port Stanley, 4, 5, 6, 15, 16, 18; Saugeen, 15; Parry Sound, 15, 18; Port Arthur, 3, 22; Winnipeg, 17, 23; Banff, 20, 21; Minnedosa, 3, 23; Qu'Appelle, 1, 17; Swift Current, 1.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 75.5°, or 3.3° above normal; the highest was 100°, at Evergreen on the 2d and 6th, and the lowest, 48°, at Riverton on the 7th and at Madison on the 9th. The average precipitation was 3.58, or 0.80 above normal; the greatest monthly amount, 16.40, occurred at Mobile, and the least, 0.46, at Sturdevant.—*F. P. Chaffee.*

Arizona.—The mean temperature was 76.1°, or 0.9° above normal; the highest was 118°, at Parker on the 10th, and the lowest, 27°, at Flagstaff on the 12th. The average precipitation was 0.36, or 0.55 below normal; the greatest monthly amount, 2.11, occurred at Bisbee, while none fell at many stations.—*W. G. Burns.*

Arkansas.—The mean temperature was 75.1°, or 1.9° above normal; the highest was 104°, at Conway on the 2d, and the lowest, 42°, at Oregon on the 8th. The average precipitation was 7.35, or 4.07 above normal, and the highest average for September on record; the greatest monthly amount, 21.95, occurred at Moore, and the least, 3.26, at Amity.—*Geo. G. Harkness.*

California.—The mean temperature was 69.2°, or 1.3° below normal; the highest was 117°, at Volcano Springs on the 8th and 19th, and the lowest, 14°, at Sneddens Ranch on the 3d. The average precipitation was 0.70, or 0.31 above normal; the greatest monthly amount, 4.09, occurred at Las Fuentes, while none fell at many stations.—*G. H. Willson.*

Colorado.—The mean temperature was 57.1°, or 1.7° below normal; the highest was 99°, at Crook, Lamar, and Minneapolis on the 2d, and the lowest, 8°, at Lake Moraine on the 12th. The average precipitation was 0.83 or 0.19 below normal; the greatest monthly amount, 3.28, occurred at Cope, while none fell at Saguache.—*O. D. Stewart.*

Georgia.—The mean temperature was 75.3°, or 1.0° above normal; the highest was 98°, at Bainbridge on the 28th, and the lowest, 51°, at Clayton and Fort Gaines on the 13th and at Diamond on the 15th. The average precipitation was 4.76, or 1.41 above normal; the greatest monthly amount, 12.08, occurred at Dahlonega, and the least, 0.26, at Morgan.—*J. B. Marbury.*

Illinois.—The mean temperature was 69.3°, or 2.3° above normal; the highest was 99°, at New Burnside on the 2d, and the lowest, 33°, at Kishwaukee on the 12th. The average precipitation was 4.86, or 1.34 above normal; the greatest monthly amount, 10.09, occurred at Robinson, and the least, 2.16 at Riley.—*C. E. Linney.*

Indiana.—The mean temperature was 69.6°, or 3.6° above normal; the highest was 100°, at Washington on the 4th, and the lowest, 32°, at Topeka on the 12th. The average precipitation was 4.06, or 0.96 above normal; the greatest monthly amount, 8.28, occurred at Greensburg, and the least, 0.86, at Bedford.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 65.3°, or slightly above normal; the highest was 99°, at Galva on the 1st, and the lowest, 29°, at Britt, Estherville, Sibley, and Spencer on the 30th. The average precipitation was 2.69, or slightly below normal; the greatest monthly amount, 8.45, occurred at Fort Madison, and the least, 0.41, at Estherville.—*G. M. Chappel.*

Kansas.—The mean temperature was 69.4°, or 0.3° above normal; the highest was 108°, at Meade on the 5th, and the lowest, 28°, at Colby on the 7th. The average precipitation was 3.85, or 1.62 above normal; the greatest monthly amount, 9.39, occurred at Fanning, and the least, 0.96, at Winfield.—*T. B. Jennings.*

Kentucky.—The mean temperature was 73.4°, or 2.6° above normal; the highest was 103°, at Russellville on the 1st, and the lowest, 42°, at Loretto on the 7th and at Maysville on the 12th. The average precipitation was 4.36, or 1.83 above normal; the greatest monthly amount, 9.20, occurred at Blandville, and the least, 1.50, at Carlisle.—*G. E. Hunt.*

Louisiana.—The mean temperature was 78.1°, or 1.3° above normal; the highest was 100°, at Liberty Hill on the 4th, 5th, and 6th, and at Rayne on the 3d, and the lowest, 51°, at Bastrop on the 8th and at Robeline on the 8th and 9th. The average precipitation was 10.31, or 7.46 above normal, and the highest average for September on record; the greatest monthly amount, 19.55, occurred at Sugartown, and the least, 3.05, at Robeline.—*A. G. McAdie.*

Maryland and Delaware.—The mean temperature was 69.9°, or 1.8° above normal; the highest was 100°, at Laurel, Md., on the 3d, and the lowest, 29°, at Deerpark and Sunnyside, Md., on the 12th. The average precipitation was 2.01, or 0.77 below normal; the greatest monthly amount, 4.28, occurred at Seaford, Del., and the least, 0.51, at Smithsburg, Md.—*O. L. Fassig.*

Michigan.—The mean temperature was 63.0°, or 3.0° above normal; the highest was 99°, at Owosso on the 3d, and the lowest, 18°, at Humboldt on the 10th. The average precipitation was 2.76, or nearly normal; the greatest monthly amount, 6.10, occurred at Mount Clemens, and the least, 1.20, at Manistee.—*C. F. Schneider.*

Minnesota.—The mean temperature was 60.6°, or about 1.0° above normal; the highest was 102°, at Wabasha on the 2d, and the lowest, 22°, at Glencoe on the 12th. The average precipitation was 1.52, or about 1.00 below normal; the greatest monthly amount, 4.56, occurred at Kochiching, and the least, 0.09, at Rolling Green.—*T. S. Outram.*

Mississippi.—The mean temperature was 76.6°, or about 2.0° above normal; the highest was 103°, at Columbus on the 18th, and the lowest, 42°, at French Camp on the 8th. The average precipitation was 6.25, or about 3.00 above normal; the greatest monthly amount, 21.76, occurred at Biloxi, and the least, 1.74, at Corinth.—*W. T. Blythe.*

Missouri.—The mean temperature was 71.1°, or 2.2° above normal; the highest was 103°, at Mexico on the 3d, and the lowest, 30°, at Potosi on the 8th. The average precipitation was 6.83, or 3.60 above normal; the greatest monthly amount, 14.67, occurred at Sublett, and the least, 3.23, at St. Louis.—*A. E. Hackett.*

Montana.—The mean temperature was 55.9°, or about normal; the highest was 96°, at Glendive on the 27th, and the lowest, 20°, at Castle on the 10th. The average precipitation was 0.96, or 0.20 above normal; the greatest monthly amount, 2.45, occurred at Poplar, and the least, 0.13, at Darby.—*E. J. Glass.*

Nebraska.—The mean temperature was 63.6°, or about normal; the highest was 104°, at Franklin on the 3d, and the lowest, 23°, at Camp Clarke on the 7th. The average precipitation was 2.30, or about 0.50 above normal; the greatest monthly amount, 8.93, occurred at Rulo, while none fell at Merriman.—*G. A. Loveland.*

Nevada.—The mean temperature was 61.1°, or about normal; the highest was 97°, at Sodaville on the 10th, and the lowest, 18°, at Elko on the 29th. The average precipitation was 0.20, or 0.07 below normal; the greatest monthly amount, 0.74, occurred at Sodaville, while none fell at several stations.—*R. F. Young.*

New England.—The mean temperature was 62.6°, or 2.6° above normal; the highest was 95°, at Lake Cochituate, Mass., on the 1st, 2d, and 3d, and at Pawtucket, R. I., on the 3d; the lowest was 25°, at Jacksonville, Vt., on the 21st. The average precipitation was 2.96, or 0.36 below normal; the greatest monthly amount, 7.08, occurred at Warner, N. H., and the least, 0.76, at Woods Holl, Mass.—*J. W. Smith.*

New Jersey.—The mean temperature was 68.6°, or 2.8° above normal; the highest was 100°, at Elizabeth and Somerville on the 1st, and at Vineland on the 3d, and the lowest, 31°, at Charlotteburg on the 21st. The average precipitation was 2.00, or 1.92 below normal; the greatest monthly amount, 3.87, occurred at Friesburg, and the least, 0.65, at Newton.—*E. W. McGann.*

New Mexico.—The mean temperature was 63.8°, or about 1.0° below normal; the highest was 98° at Eddy on the 4th, and the lowest, 18°, at Buckmans and Winsors on the 12th. The average precipitation was 0.74, or about 1.00 below normal; the greatest monthly amount, 1.74, occurred at Mesilla Park, while none fell at Bluewater.—*R. M. Hardinge.*

New York.—The mean temperature was 64.2°, or 3.2° above normal; the highest was 98°, at Willets Point on the 4th, and the lowest 27°, at Number Four on the 21st. The average precipitation was 2.96, or 0.41 below normal; the greatest monthly amount, 6.63, occurred at Canton, and the least, 1.01, at Primrose.—*R. G. Allen.*

North Carolina.—The mean temperature was 72.3°, or 2.0° above normal; the highest was 95°, at Tarboro on the 1st, and the lowest, 40°, at Highlands on the 25th. The average precipitation was 4.24, or slightly below normal; the greatest monthly amount, 11.21, occurred at Highlands, and the least, 0.90, at Beaufort.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 56.5°, or 0.2° below normal; the highest was 98°, at Medora on the 2d, at Wahpeton on the 1st, and at Washburn on the 20th, and the lowest, 10°, at Fort Yates on the 11th. The average precipitation was 1.27, or 0.12 above normal; the greatest monthly amount, 3.40, occurred at Churchs Ferry, and the least, 0.15, at Ellendale.—*F. J. Rupert.*

Ohio.—The mean temperature was 67.8°, or 2.5° above normal; the highest was 102°, at Seaman on the 1st, and the lowest, 33°, at the same station on the 12th. The average precipitation was 2.56, or 0.04 below normal; the greatest monthly amount, 7.31, occurred at Bement, and the least, 0.83, at New Bremen.—*J. Warren Smith.*

Oklahoma.—The mean temperature was 74.1°; the highest was 106°, at Anadarko on the 15th, and the lowest, 35°, at Arapaho and Putnam on the 12th. The average precipitation was 2.24; the greatest monthly amount, 12.13, occurred at Tahlequah, and the least, trace, at Kemp.—*J. I. Widmeyer.*

Oregon.—The mean temperature was 60.0°, or 2.1° above normal; the highest was 103°, at Vernonia on the 7th, and the lowest, 13°, at Burns on the 30th. The average precipitation was 2.24, or 0.55 above normal; the greatest monthly amount, 8.74, occurred at Glenora, and the least, trace, at Lakeview and P. Ranch.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 66.0°, or 3.2° above normal; the highest was 100°, at Hawley and Lockhaven on the 1st, and at Aqueduct on the 3d, and the lowest, 25°, at Dushore on the 21st. The average precipitation was 1.70, or 1.87 below normal; the greatest monthly amount, 3.95, occurred at Kennett Square, and the least, 0.38, at Lockhaven.—*T. F. Townsend.*

South Carolina.—The mean temperature was 76.0°, or 1.9° above normal; the highest was 96°, at Cheraw on the 28th and at Kingstree on the 4th, and the lowest, 43°, at Shaws Fork on the 13th. The average precipitation was 4.06, or nearly normal; the greatest monthly amount, 10.64, occurred at Mount Carmel, and the least, trace, at Georgetown.—*J. W. Bauer.*

South Dakota.—The mean temperature was 61.5°, or about 1.0° above normal; the highest was 110°, at Interior on the 2d, and the lowest, 18°, at Rochford on the 10th. The average precipitation was 0.90, or 0.42 below normal; the greatest monthly amount, 1.91, occurred at Desmet, and the least, 0.04, at Nowlin.—*S. W. Glenn.*

Tennessee.—The mean temperature was 73.2°, or about 3.0° above normal; the highest was 100°, at Dover on the 4th, and the lowest, 38°, at Erasmus on the 8th. The average precipitation was 4.31, or about 0.50 above normal; the greatest monthly amount, 8.31, occurred at Kingston, and the least, 1.75, at Carthage.—*H. A. McNally.*

Texas.—The mean temperature, determined by comparison of 35 stations distributed throughout the State, was 1.1° above the normal. There was a slight deficiency in temperature over west Texas and the panhandle and nearly normal conditions prevailed along the west coast and over southwest Texas, while the temperature was above the normal over the other portions of the State, with the greatest excess over east Texas and the eastern portion of central Texas. The highest was 106°, at Rhineland on the 13th, and the lowest, 37°, at Amarillo on the 11th. The average precipitation, determined by comparison of 36 stations distributed throughout the State, was 1.79 below the normal. There was a slight excess along the east coast and in the vicinity of Longview, while there was a general deficiency elsewhere ranging from about 1.00 to 3.50 over the panhandle, central, west, southwest, and north Texas and from 1.10 to 4.13 over east Texas and the western portion of the coast district, with the greatest deficit in the vicinity of College Station. The greatest monthly amount, 6.78, occurred at Galveston, while none fell at Sanderson and Valentine.—*J. L. Cline.*

Utah.—The mean temperature was 61.0°, or about normal; the highest was 102°, at St. George on the 6th, and the lowest, 18°, at Loa on the 10th and at Woodruff on the 11th. The average precipitation was 0.10; the greatest monthly amount, 1.04, occurred at Vernal, while none fell at many stations.—*J. H. Smith.*

Virginia.—The mean temperature was 68.7°, or about 1.0° above normal; the highest was 99°, at Alexandria on the 3d and at Tobaccoville on the 5th, and the lowest, 36°, at Burkes Garden on the 9th. The average precipitation was 2.98, or 1.49 below normal; the greatest monthly amount, 6.40, occurred at Wytheville, and the least, 0.84, at Alexandria.—*E. A. Evans.*

Washington.—The mean temperature was 59.5°, or about 2.0° above

normal; the highest was 96°, at Fort Spokane on the 17th and at Lind on the 18th, and the lowest, 24°, at Hunters on the 28th. The average precipitation was 2.78, or about 0.75 above normal; the greatest monthly amount, 7.65, occurred at Cedar Lake, and the least, 0.05, at Kennewick.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 67.6°; or about 2.5° above normal; the highest was 97°, at New Cumberland on the 1st, and the lowest, 33°, at Uppertract on the 11th. The average precipitation was 2.42, or about 0.65 below normal; the greatest monthly amount, 4.75, occurred at Huntington, and the least, 0.80, at Green Sulphur Springs.—*C. M. Strong.*

Wisconsin.—The mean temperature was 62.4°, or 1.4° above normal; the highest was 99°, at Medford and Spooner on the 2d, and the lowest, 23°, at Barron and Knapp on the 10th. The average precipitation was 2.00, or 0.95 below normal; the greatest monthly amount, 3.70, occurred at Koepenick, and the least, 0.51, at Pekin.—*W. M. Wilson.*

Wyoming.—The mean temperature was 54.2°, or 3.1° below normal; the highest was 100°, at Bittercreek on the 19th, and the lowest, 8°, at Atlantic City on the 28th. The average precipitation was 0.25, or 0.74 below normal; the greatest monthly amount, 0.90, occurred at Fort Yellowstone, while none fell at Bittercreek, Carbon, and Labarge.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

THE PROBABLE STATE OF THE SKY ALONG THE PATH OF TOTAL ECLIPSE OF THE SUN, MAY 28, 1900.

Second report, observations of 1898, by Prof. FRANK H. BIGELOW.

In the MONTHLY WEATHER REVIEW for September, 1897, was published the first report of the observations taken under the direction of the United States Weather Bureau, in order to determine the probable meteorological conditions likely to prevail along the path of the total eclipse of the sun, which will occur in the Southern States, on May 28, 1900. The present report is the second of the series and contains the result of the survey of the sky along the path, for the period beginning May 15 and ending June 15, 1898; it will be followed by a third in 1899. The observations have been conducted during 1898 on precisely the same plan as in the preceding year, and generally by the same observers, so that the correctness of the numbers herein given is fortified by longer experience than was the case in 1897. Moreover 87 stations reported this year, as against 62 stations last year.

The scale of the observations is as follows: For the *general state of the sky*, 0 = sky entirely clear; 1 = sky ¼ cloudy; 2 = sky ½ cloudy; 3 = sky ¾ cloudy; 4 = sky entirely overcast. For the *sky near the sun*, 0 = sun clear from clouds; 1 = sun in scattered clouds; 2 = sun in a mass of clouds; 3 = sun quite invisible. Hence the sums of the numbers recorded indicate the total observed cloudiness. Since, under general state of the sky, this might have been equal to 12 for each day, the total possible cloudiness would be 384 for the given 32 days; and for the sky near the sun the sum might be 9 for each day, and 288 for 32 days. Hence, dividing the totals at any station by these numbers, we have its percentage; or, dividing the mean for all the stations within a State by these numbers, we have the percentage for that State.

TABLE 1.

Stations.	Observers.	General state of the sky, a. m. 8:00	8:30	9:00	Sum.	Sky near the sun, a. m. 8:00	8:30	9:00	Sum.
Virginia.									
Onancock	J. C. Weaver	58	54	57	169	41	38	39	118
Birdsnest	C. R. Moore	76	72	72	220	55	44	46	145
Hampton Institute	C. L. Goodrich	64	64	63	191	39	39	36	114
Cape Henry	C. P. Cronk	66	68	70	204	46	52	50	148
Norfolk	James J. Gray	62	57	56	175	45	42	41	128
Indika	J. O. Branch	38	34	33	105	20	19	20	59
Wallacetown[1]	Jno. G. Wallace	50	49	59	177	43	40	43	126
Means					177				120
Per cent of total	possible cloudiness				44.9				41.7
North Carolina.									
Willeyton	H. B. Cross	51	49	46	146	35	32	27	94
Gatesville	J. T. Walton	44	43	33	120	30	29	23	82
Winton[2]	S. S. Daniel	20	20	19	59	17	17	16	50
Scotland Neck	W. L. Howell	39	40	39	118	35	36	32	103
Weldon	T. A. Clark	57	61	53	171	39	42	36	117
Nashville	J. B. Boddie	86	72	62	220	57	51	47	155
Rockymount	Gaston Battle	56	54	55	165	44	42	39	125
Springhope	Geo. W. Bunn	48	48	44	140	34	31	31	96
Wilson	W. S. Harriss	26	26	26	78	15	16	16	47
Louisburg	Thomas B. Wilder	29	29	26	84	14	16	14	44
Auburn	Troy Poole	37	35	36	108	26	23	23	72
Selma	R. J. Noble	23	18	21	63	18	15	17	50
Raleigh	C. F. von Herrmann	59	58	53	170	40	37	36	113

TABLE 1—*Continued.*

Stations.	Observers.	General state of the sky, a. m. 8:00	8:30	9:00	Sum	Sky near the sun, a. m. 3:00	8:30	9:00	Sum
North Carolina-Con.									
Pittsboro	A. H. Merritt	48	39	36	123	36	31	25	92
Moncure	W. H. Thompson	38	34	30	102	28	24	21	73
Albemarle	G. M. Dry	32	32	32	96	17	16	16	49
Fayetteville	Frank Glover	36	37	34	108	23	25	24	72
Laurinburg	L. D. McKinnon	24	27	21	72	21	21	16	58
Rockingham	J. M. Stansill	41	33	24	98	14	7	4	25
Wadesboro	W. K. Boggan	13	10	6	29	10	5	3	18
Monroe	T. A. Ashcroft	23	17	14	54	14	8	6	28
Means					111				74
Per cent of total	possible cloudiness				28.2				25.7
South Carolina.									
Cheraw[3]	James H. Powe	36	34	31	101	24	22	22	68
Lancaster	J. C. Foster	32	32	31	95	16	17	14	47
Lewis	S. M. Burdell	16	19	20	55	14	18	22	54
Santuck	E. W. Jeter	21	16	14	51	13	15	8	36
Columbia	J. W. Bauer	34	29	28	91	22	24	21	67
Little Mountain	Jno. M. Lease	38	36	26	100	25	19	15	59
Prosperity (near)	J. Perry Cook	19	18	17	54	16	14	11	41
Chappels	Samuel R. Keith	28	23	18	69	19	10	12	41
Longshore	W. G. Peterson	33	28	22	83	19	12	6	37
Crosshill[3]	E. T. McSwain	19	20	18	57	17	17	16	50
Saluda	Ernest L. Mathers	31	28	23	82	20	17	14	51
Greenwood	M. M. Calhoun	11	15	15	41	8	9	10	27
Trenton	C. A. Long	10	9	5	24	7	5	3	15
Troy	A. C. Kennedy	43[3]	43	39	125	27[3]	21	17	65
Hodges	W. K. Carlisle	22	22	15	59	15	17	8	40
Watts	Dr. J. W. Thomas	24	21	17	62	20	16	11	47
Mount Carmel	Jno. D. Cade	5	9	15	29	7	11	20	38
Means					69				46
Per cent of total	possible cloudiness				17.5				16.0
Georgia.									
Camak	J. A. Chapman	16	11	3	30	12	8	1	21
Crawfordville	J. P. Moody	26	24	24	74	6	6	5	17
Athens	C. D, Cox	21	18	16	55	14	8	4	26
Covington	J. S. Carroll	7	8	9	24	18	18	21	57
Atlanta	P. McDonough; H. P. Hardin	28	28	24	80	21	19	18	58
Griffin	E. Lovelace	12	12	16	40	6	8	10	24
Macon	A. G. Goodloe	8	10	9	27	6	10	8	24
Talbotton	Wm. T. Dennis	22	22	21	65	7	7	8	22
Westpoint	T. J. Jennings	10	7	4	21	5	3	2	10
Columbus	Josephine W. Long	33	17	14	64	23	16	11	50
Means					48				31
Per cent of total	possible cloudiness				12.2				10.8
Alabama.									
Smiths Station	A. H. Frazer	18	17	18	53	15	17	11	43
Fort Mitchell	John Cantey	32	28	27	87	20	20	20	60
Auburn	James T. Anderson	26	22	19	67	21	15	17	53
Loachapoka	W. W. David	25	24	23	72	11	14	11	36
Tallassee[3]	J. T. Jarman	29	29	25	83	24	21	17	62
Union Springs	P. L. Cowan	17	20	20	57	18	21	21	60
Mathews	W. D. Dillard	16	15	14	45	10	10	12	32
Montgomery	I. Gwynn Gardiner	39	16	7	62	33	13	5	51
Highland Home	Samuel Jordan	20	18	16	54	11	5	2	18
Fort Deposit	J. F. Haltemir	18	14	8	40	9	6	5	20
Greenville	F. E. Dey	17	13	5	35	9	5	0	14
Pineapple	J. S. Crum	30	42	33	105	38	40	25	103
Castleberry	S. Castleberry	17	13	12	42	18	11	11	40
Bay Minette	Mrs. M. J. Washburn	18	19	21	58	16	21	25	62
Latham	M. McGowan	16	16	16	48	6	6	4	16
Mobile	W. M. Dudley; Herbert E. Vail	35	33	31	99	10	12	13	35
Mount Vernon	C. Becker	48	45	42	135	29	30	25	84
Citronelle	J. G. Michael	19	19	21	59	12	5	10	27
Means					67				48
Per cent of total	possible cloudiness				17.1				15.7
Mississippi.									
Leakesville	Samuel Pool	14	17	15	46	15	13	19	47
Americus	E. Davis	37	39	44[3]	120	55	54	56	165
Ocean Springs	Harley F. Halstead	6	10	8	24	4	8	6	18
Biloxi[2]	James J. Lemon	36	37	41	114	22	24	25	71
Bay St. Louis	Brother Isidore	44	42	40	126	24	22	21	67

TABLE 1.—*Continued.*

Stations.	Observers.	General state of the sky, a. m.				Sky near the sun, a. m.			
		8:00	8:30	9:00	Sum.	8:00	8:30	9:00	Sum.
Mississippi—Con'd.									
Pearlington	Annette Koch.......	39	39	37	115	30	28	28	86
Means............	....	.....	.....	.....	91	.....	.....	.....	76
Per cent of total	possible cloudiness..	.....	.....	.....	23.0	.....	.....	.....	26.4
Louisiana.									
Poydras............	P. V. Relimpio	42	45	46	133	16	16	22	54
New Orleans.........	H. F. Alciatore......	59	61	67	187	27	29	33	89
SouthernUni'yFarm	Hugh Jamieson	41	45	41	127	27	29	24	80
Houma...	Mrs. K. M. Haggerty	39[3]	49[3]	53[3]	141	29	28	29[3]	86
Napoleonville	Edward Godchaud..	57	48	39[3]	144	38	28	23	89
Paincourtville......	Jos. E. LeBlanc	25	38	46	109	21	33	38	92
Franklin	J. M. Bonney........	51	54	58	163	40	52	37	129
Means............	....	.....	.....	.....	143	.....	.....	.....	89
Per cent of total	possible cloudiness..	.....	.....	.....	36.4	.....	.....	.....	30.9

[1] Three days missing. [2] Four days missing. [3] One day missing.

In Table 1 are given the States, the stations, the observers, the sums of the daily numbers at each station, deduced from the observations at 8:00, 8:30, and at 9:00 each morning, both for the entire sky and for the sky near the sun respectively; also the sum for the three sets in each group, the mean for each state, and finally the percentage. Collecting these last together in Table 2 the result is presented compactly. It may be compared with the corresponding result for 1897, which is copied from the first report, and placed in the lower section of the table.

TABLE 2.—*Percentage of cloudiness, by States.*

Name of State.	General sky.	Near the sun.	Name of State.	General sky.	Near the sky.
YEAR OF OBSERVATION, 1898.					
Virginia	44.9	41.7	Alabama	17.1	15.7
North Carolina........	28.2	25.7	Mississippi	23.0	26.4
South Carolina.........	17.5	16.0	Louisiana	36.4	30.9
Georgia.............. ...	12.2	10.8			
YEAR OF OBSERVATION, 1897.					
Virginia	49.2	42.7	Alabama	15.2	14.9
North Carolina........	35.8	33.3	Mississippi	....	....
South Carolina..... ..	33.7	32.1	Louisiana	26.5	21.5
Georgia................	18.4	16.0			

Chart IX, at the end of the WEATHER REVIEW for this month is constructed in the same manner as that for last year, and gives under the name of each station the two observation sums, (1) for the general sky, and (2) for the sky near the sun. This will enable the reader to consider the local conditions more closely. The original observation sheets contain notes describing the weather of each day at the several stations. An inspection of Table 2 indicates that the observations of 1898 give *precisely the same* result as those of 1897, which is as follows: *The weather conditions in the interior of Georgia and Alabama were better than in Virginia, North Carolina, South Carolina, Mississippi, and Louisiana; and judging from this table it would be much safer for the eclipse expeditions to locate their stations in the northern portions of Georgia and Alabama, upon the southern end of the Appalachian Mountains, where the track crosses the elevated areas, than nearer the coast line in either direction northeastward toward the Atlantic coast, or southwestward toward the Gulf coast; on the coast itself the weather is more unfavorable than in any other portion of the track.*

In 1898 the weather was decidedly better along the Georgia portion of the track, somewhat better near the Atlantic coast, but worse nearer the Gulf coast than in 1897. In both years the percentage of cloudiness was three times greater near the coast than in the Georgia and Alabama portions of the track.

These observations will be continued in the year 1897.

ELECTRIC SIGNAL APPARATUS AT ATLANTIC CITY, N. J.

By AL. BRAND, Observer Weather Bureau (dated October 13, 1898).[1]

I have the honor to inclose herewith a drawing and description of the electrical signal apparatus recently installed at the Weather Bureau station in Atlantic City. The support, as built, was devised by myself, with the help of several valuable suggestions offered by Mr. Hudson S. Vaughan, architect, and by making use of the lowering feature of the old Maring anemometer support.

Having been informed that the usual method at stations using electric lights for signals is to have the regulation lanterns attached to the flag pole, therefore I am inclined to believe that my support has nothing in common with those in use at other stations.

The suggestion of the Central Office in regard to pilot lamps was adopted, and I have had these lamps placed directly on the switch board, which is in a convenient position above the observer's desk.

DESCRIPTION OF WORK AND MATERIALS.

Support.

The fixed or lower portion of the support (see Chart VIII, Fig. 1) is built up of well-seasoned yellow pine in the shape of a sheath, or channel, the dimensions of which are as follows: The two side pieces are 14 feet and 9 inches long and 3 inches by 5 inches at the top, gradually diminishing to 3 inches by 6 inches at the base. The centerpiece, which extends from within about 1 foot of the top to the base, is $2\frac{1}{2}$ inches thick and of a sufficient depth to fill out the remaining space on one side of the pipe when the latter is in a perpendicular position. From about 6 inches below the pipe to the bottom of the support the centerpiece is built out flush with the sides. The three pieces of the support are securely bolted together with $\frac{1}{2}$-inch iron bolts. The support rests on a piece of timber 3 inches thick by 10 inches wide and 2 feet long, and is bolted to the chimney with three $\frac{5}{8}$-inch iron bolts. The metal portion of the support is built up of two lengths of galvanized-steel pipe, the upper portion of which is 18 feet long and $1\frac{1}{2}$ inch in diameter on the outside, the lower portion being 20 feet long and $2\frac{1}{2}$ inches in diameter on the outside. The smaller pipe is made to pass into the larger for a distance of about 3 feet, and made thoroughly rigid at that point with molten metal. Steel elbow and "T" fittings, short pieces of pipe and hooks, are used in making the short horizontal arms on which the lamps are hung, and which are fastened to the tops of both the larger and smaller pipe, as shown in drawing. The centers of the hooks, on which the lamps swing, are at a distance of just one-half of the diameter of the bottom of a lamp from the side of the upright pipe. This insures the lamps swinging plumb, and at the same time snugly against the pipe, thus relieving the latter from all unnecessary strain. The steel pipe swings at a point within 6 inches of the top of the wooden support, on a $\frac{1}{2}$-inch hardened steel pin, which passes through the larger portion of the pipe at a point 9 feet below the bottom horizontal arm, washing in two $\frac{3}{8}$-inch iron plates 6 by 6 inches square. Pin has head and nut washers.

The pipe being swung into a perpendicular position (which causes all of that portion of the pipe below the pivot pin to enter into the channel) it is securely locked in place by a $\frac{5}{16}$-inch steel pin near the base.

A block of $2\frac{1}{2}$ inches wide and about 6 inches long, and of a sufficient depth so as to fill out the remaining space on the

[1] Having seen a newspaper paragraph commendatory of the special devices in use at Atlantic City by the Weather Bureau observer, in connection with his electric signals, the Editor has requested Mr. Brand to publish some account of these in the MONTHLY WEATHER REVIEW, so that others may profit by his experience.—ED.

front of pipe, is bolted between the side pieces just above the pivot pin.

Wiring.

All of the wire used on the support or in the lamps, is what is known as canvasite cord made up of two strands of flexible wire. A separate circuit is run from each lamp to the switchboard in the office. The wire being connected with a porcelain weather proof socket (care being taken to have the said socket fastened to the inside of lantern in such a manner as to insure that the bulb of the incandescent lamp hangs squarely in the center of the lantern lenses) passes out through the ventilation opening at the top of the lantern, and enters the pipe at the "T" fitting in each of the short horizontal arms, thence passing down on the inside of the pipe to a point about 3 or 4 inches above the top of the wooden portion of the support, where a hole has been drilled to allow of its passing out and down the side of the wooden support, on porcelain knobs, to the side of chimney, which it enters.

Lamps.

The lamps were wired with one 32-candle power incandescent electric lamp in each, and in such a manner that the oil lamps can be substituted at any time without delay. The manner in which the incandescent lamp sockets were fastened to the inside of the lanterns will be best understood by an examination of a sketch showing a cross section of lantern globe and lamp socket (see Chart VIII, at side). It will be noticed that all that is necessary to firmly fix a socket in a lamp, when so wired, is to draw up the socket until the wire prongs, when spread out, will touch the sides of the lantern above the glass globe. By simply bending, in or out, the various prongs, the socket can be brought squarely in the center of lantern. All surplus wire should be drawn from the top of lantern.

The bottoms of the lanterns are fastened to the steel upright by a brass 1-inch band passing around each lantern and bolted on either side of pipe as shown in drawing.

Switchboard.

The switchboard is made of enameled black slate, 15 by 18 inches, provided with two 32-candle power incandescent electric pilot lamps, having opalescent shades, and two baby knife switches. The mains and knife switches are fused on front of board. All connections are made in rear of board, which is set into a neat varnished oak frame.

Painting.

Both the wood and metal portion of the support were given two good coats of paint, the first coat on the metal being mineral paint.

General Remarks.

While there is no doubt about a support erected in this manner being able to withstand any strain due to ordinary high winds, 30 to 40 miles, it should be observed closely during winds of a higher velocity, and if found necessary, three or four wire guys run up to within about 5 feet of the top lantern, after which it is thought that its strength will be equal to that of the combined wind vane and anemometer support. In order to make these guys easily detachable, they can be fitted with strong durable spring snaps to snap into the anchor irons.[1]

The only sway, which was very slight, noticed during the highest winds, since the erection of the new support, was confined entirely to the upper section. It was not a back and forward movement, but more in the nature of a slight lean with the wind, due to the elasticity of the steel pipe.

While a support erected along these lines insures an unobstructed display in every direction, it also permits of lowering the lanterns at a moment's notice, should occasion require, while the lanterns wired in this manner, are not mutilated in the least.

Should neither a suitable wall or chimney be available for the erection of a support of this kind, it might easily be stayed by iron braces.

[1] The greatest strain on the mast during high winds comes at the point through which the pivot bolt passes, and a hole through the iron pipe at this point weakens it appreciably. The construction at this point should be modified so that the full strength of the pipe may be retained. This size of mast would not be strong enough for lanterns heavier than the regulation masthead lantern now in use.—H. E. W. and C. F. M.

OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, a copy of the daily record at Honolulu is communicated to the Weather Bureau in advance of its official publication, and is herewith printed, as a special contribution, for the convenience of those who are studying the relations of the storms and weather of the United States to those of adjacent countries, with a view to long-range, seasonal predictions.

Meteorological observations at Honolulu.

AUGUST, 1898.

August, 1898.	Pressure at sea level.			Temperature.					Relative humidity.			Wind.		Cloudiness.	Rain measured at 6 a. m.
	7 a. m.	3 p. m.	9 p. m.	6 a. m.	2 p. m.	9 p. m.	Maximum.	Minimum.	7 a. m.	2 p. m.	9 p. m.	Direction.	Force.		
1.	30.07	30.03	30.09	76	81	77	82	75	67	61	67	ne.	4	3-9	0.02
2.	30.05	30.01	30.05	75	81	76	82	74	71	58	71	nne.	3	2-8	0.00
3.	30.03	29.99	30.02	74	78	76	83	73	74	75	78	ne.	3-0	4-7	0.01
4.	30.00	29.95	30.01	74	83	76	84	72	80	58	74	ne-nne.	2-4	4-2	0.06
5.	29.90	29.93	29.99	75	82	77	83	72	74	64	75	ne.	3	7	0.00
6.	30.02	30.00	30.07	74	83	77	84	72	87	60	75	ne.	3	5	0.06
7.	30.08	30.04	30.08	77	81	78	83	75	75	69	69	ne.	3	9-6	0.03
8.	30.07	30.01	30.08	75	83	78	85	74	70	58	67	ne.	3	3	0.00
9.	30.07	30.01	30.06	77	83	78	84	76	67	52	67	ne.	2	4-1	0.00
10.	30.08	30.03	30.09	76	82	75	83	72	67	58	68	ne-n.	2-0	9-5	0.00
11.	30.06	30.01	30.07	74	80	77	83	72	74	61	68	nne.	3-4	6-2-6	0.07
12.	30.09	30.02	30.09	73	79	77	80	70	86	62	68	ne.	3	10-8	0.28
13.	30.08	30.03	30.08	75	81	75	83	74	70	54	78	ne.	4	5	0.02
14.	30.08	30.04	30.09	73	82	77	82	70	78	58	69	ne.	3	4	0.15
15.	30.09	30.02	30.11	74	80	76	83	71	78	64	78	ne.	3-4	4	0.01
16.	30.09	30.05	30.10	74	82	78	83	72	82	65	70	ne.	3	6	0.10
17.	30.10	30.01	30.07	75	84	76	84	73	78	53	66	ne.	2	3-1	0.01
18.	30.03	29.96	30.01	72	82	75	83	69	82	53	66	ne.	3	1	0.00
19.	30.02	29.95	30.03	66	83	74	84	65	85	49	70	nne.	3	1-0	0.00
20.	30.03	29.99	30.07	67	83	75	84	65	90	52	74	se-ne.	2	1	0.00
21.	30.07	29.99	30.05	68	83	76	86	66	90	59	74	e-n.	2	3-7-1	0.00
22.	30.03	29.98	30.04	76	83	76	85	75	66	59	78	ne.	3-0	3	0.04
23.	29.99	29.95	30.03	76	83	76	83	72	66	59	68	ne.	3	4	0.02
24.	30.04	30.01	30.10	75	82	73	84	74	70	58	84	ne.	4	4	0.01
25.	30.11	30.09	30.14	74	81	77	84	71	74	61	72	ene.	4	6	0.16
26.	30.12	30.06	30.13	75	82	74	83	72	74	55	72	nne.	5-3	4-2	0.12
27.	30.10	30.03	30.09	73	81	77	82	71	78	54	67	nne-e.	3	2-8	0.04
28.	30.07	30.01	30.07	75	80	75	81	70	70	61	68	ne.	0-3	10-3	0.03
29.	30.06	30.01	30.11	74	81	77	84	72	74	63	65	ene-ne.	3	3-8	0.62
30.	30.11	30.05	30.12	75	81	77	83	73	70	61	67	ne.	4	6	0.18
31.	30.07	29.98	30.03	74	79	76	82	73	74	63	69	ne.	3	6	0.04
	30.06	30.01	30.07	73.9	81.6	76.2	83.2	71.9	75.5	57.6	71.0	....	2.9	5.0	2.08

The station is at 21° 18′ N., 157° 50′ W.; altitude 50 feet.

Pressure is corrected for temperature and reduced to sea level, but the gravity correction, —0.06, is still to be applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 10. Two directions of wind, or values of wind force, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is given as measured at 6 a. m. on the respective dates.

The rain gauge, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 50 feet above sea level.

Monthly mean temperature (6 + 2 + 9) ÷ 3 is 77.2, and the normal mean is ——. The normal rainfall for August is ——.

OBSERVATIONS AT PORT AU PRINCE, HAITI.

Through the kind cooperation of Prof. T. Scherer of Port au Prince, Haiti, the meteorological observations taken by him at 7^h 12^m a. m., local time, or noon, Greenwich time, are communicated in manuscript for early publication in the

MONTHLY WEATHER REVIEW. The original reports are in metric measures; the conversions are by the Editor.

The barometer is 119 feet above sea level; its readings have been corrected by Professor Scherer for temperature and elevation, and also since July 1, 1898, for gravity; this latter correction is —0.064 inch; the thermometers are 6.7 feet above ground; the rain gauge, 7.2 feet above ground. The wind velocity is given in miles per hour.

The position of Port au Prince, Haiti, is latitude 18° 34′ N., longitude 72° 21′ W., or 4^h 49^m west of Greenwich. Additional records for this station are published in the annual volumes of the Central Meteorological Institute at Vienna.

Observations at Port au Prince, Haiti.

AUGUST, 1898.

Date.	Pressure.		Temperature.			Rel. humidity.	Wind.		Clouds.			Preceding 24 hours.		
	Local.	Sea level.	Dry.	Wet.	Dew-point.		Direction.	Velocity.	Kind.	Amount.	Direction.	Temperature. Max.	Temperature. Min.	Total rain.
	Ins.	Ins.	°	°	°	%						°	°	Ins.
1.....	29.86	30.00	77.0	72.7	70.2	80	se.	1	k	1	sw.	93.2	73.4	0.00
2.....	29.84	29.96	78.1	74.1	72.9	82	......	0	k	0	se.	92.8	72.5	0.22
3.....	29.81	29.93	78.4	72.9	69.4	75	e.	2	ck	0	s.	92.1	71.6	0.51
4.....	29.85	29.97	76.8	74.3	72.0	86	ese.	1	k	2	e, wnw.	94.1	71.6	1.12
5.....	29.88	30.00	77.2	74.3	72.5	87	......	0	k	9	ne.	93.6	74.5	0.05
6.....	29.87	29.99	77.2	69.1	63.5	65	ese.	4	....	0	....	91.4	70.9	0.00
7.....	29.84	29.96	78.4	72.3	68.5	73	e.	3	....	0	....	91.9	72.3	0.81
8.....	29.87	29.99	80.8	73.8	60.4	70	e.	1	cs	1	....	90.5	75.6	0.00
9.....	29.85	29.97	79.3	71.6	66.7	67	se.	3	....	0	....	93.4	73.2	0.00
10.....	29.85	29.97	77.0	72.0	68.7	77	......	0	....	0	....	95.9	71.8	0.00
11.....	29.82	29.95	77.4	72.1	68.9	76	e.	1	....	0	....	90.9	70.2	1.09
12.....	29.84	29.96	76.8	72.1	69.3	79	ese.	3	ks	10	....	91.8	74.1	0.00
13.....	29.82	29.94	79.3	73.2	69.4	73	ese.	2	....	0	....	91.4	73.0	0.00
14....	29.86	29.98	75.6	73.6	72.5	90	......	0	k, n	10	....	90.3	72.0	0.44
15.....	29.84	29.96	77.5	73.9	71.8	83	......	0	k, cs	1	....	92.5	74.3	T.
16.....	29.79	29.91	76.1	74.3	73.2	91	......	0	k, cs	4	....	89.8	72.0	0.80
17.....	29.76	29.88	77.5	71.6	68.0	73	e.	1	k	0	ene.	89.8	73.9	0.00
18.....	29.76	29.89	77.4	73.2	70.7	87	ese.	4	k	9	....	87.8	75.0	0.00
19.....	29.82	29.94	79.9	73.9	70.3	74	ese.	4	k	1	....	82.0	72.9	0.05
20.....	29.85	29.97	79.7	73.9	70.7	75	ese.	5	cs	1	....	91.4	72.9	T.
21.....	29.85	29.97	78.3	72.5	70.7	79	e.	4	cs	1	....	87.6	73.2	T
22.....	29.82	29.94	75.7	70.9	67.8	77	se.	5	cs	1	nw.	87.1	71.8	0.28
23.....	29.84	29.97	77.9	72.0	68.2	73	e.	4	k	4	s.	91.2	75.2	0.23
24.....	29.90	30.02	78.1	70.2	64.9	66	ese.	4	cs	2	....	90.1	70.9	0.00
25.....	29.88	30.01	74.1	72.5	71.6	91	......	0	s	0	se.	91.9	70.9	0.06
26.....	29.83	39.95	77.2	74.7	73.2	88	......	0	cs	1	calm.	88.9	74.7	0.00
27.....	29.78	29.90	77.5	74.3	72.5	85	......	0	cs	7	sse-se.	88.7	72.3	T.
28.....	29.82	29.94	78.3	73.9	71.6	87	e.	4	s	1	e.	89.1	73.8	0.00
29.....	29.86	29.98	78.1	71.4	67.1	70	e.	2	....	0	....	89.6	72.3	0.68
30.....	29.83	29.95	76.6	73.8	76.5	98	......	0	....	0	....	90.1	72.0	0.00
31.....	29.84	29.96	77.2	74.1	72.3	86	e.	1	....	0	....	91.0	72.1	0.06
Sum..	......	......	....	.....	.....	....	......	...	....	...	....	.....	.....	6.15
Means	29.84	29.96	77.7	72.9	70.2	79.1	......	1.9	....	...	....	90.7	72.9	.....

NOTE.—According to the new form recently received from the Weather Bureau the above barometric pressure, reduced to sea level, has also received the correction —1.57 millimeters for reduction to standard gravity. This correction was first applied for the month of July, and will be so continued hereafter.—T. S.

[Apparently the gravity correction has also been applied by Professor Scherer to the barometric readings before reduction to sea level, so that in these columns we have the true local pressure as well as the true sea-level pressure. This is in accordance with the instructions on Form 1040, which read as follows:

"Under local pressure enter the observed reading of the barometer after correcting for all known sources of instrumental error, including capillarity, error of scale or zero point, temperature of scale or mercury, or of the vacuum box in the case of an aneroid, and the variations of the force of gravity from normal gravity. If any of these corrections are unknown or unattended to, please state that fact."—ED.]

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Mariano Bárcena, Director, and Señor José Zendejas, vice-director, of the Central Meteorologico-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the *Boletin Mensual;* an abstract translated into English measures is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for August, 1898.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Temperature. Min.	Temperature. Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	Inch.	° F.	° F.	° F.	%	Inch.		
Durango (Seminario)	6,243	24.07	82.4	54.5	68.0	56	5.26	e	e.
Leon (Guanajuato)..	5,934	24.29	80.4	55.4	66.2	69	7.09	ene.	ese.
Linares (New Leon)..	1,188	28.66	96.8	71.6	84.2	69	4.41	sse.	se.
Magdalena (Sonora).	2,618	......	93.9	79.0	87.4	......	9.25	s.	n.
Merida	50	29.91	96.4	69.1	82.0	75	5.50	ne.	e.
Mexico (Obs. Cent.)..	7,472	23.06	74.8	52.2	61.7	72	5.56	n.	ne.
Morelia (Seminario)..	6,401	23.97	77.0	56.5	64.2	83	5.61	ssw.	e.
Pueblo	7,112	23.28	75.6	50.7	64.0	49	7.73	ese.	....
Saltillo	5,399	24.78	87.8	58.6	73.4	72	3.19	n.	nw.
Trejo (Hac de S. G.).	....	....	75.7	66.2	......	......	9.54	ne.	....
Tuxpan (Vera Cruz).	....	30.19	93.2	70.3	82.0	80	14.13	ne.	sw.
Zacatecas	8,015	22.53	78.0	45.7	60.3	72	4.13	e.	e.

Mexican data for September, 1898.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Temperature. Min.	Temperature. Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	Inch.	° F.	° F.	° F.	%	Inch.		
Colima............. ...	....	......	88.9	68.7	77.7	.....	......	....	....
Durango (Seminario).	6,243	24.05	77.4	51.8	56.3	......	5.90	....	e.
Leon (Guanajuato)...	5,934	24.37	79.2	49.3	66.2	67	3.11	ene.	e.
Mazatlan	25	29.86	90.5	71.6	82.4	81	9.37	nw.	ne.
Merida (Yucatan)....	50	29.82	97.9	70.9	81.0	80	7.13	e.	e.
Mexico (Obs. Cent.)..	7,472	23.08	75.2	50.0	61.2	71	4.21	n.	ne.
Morelia (Seminario)..	6,401	23.93	74.1	54.3	63.9	81	5.44	sw.	ene., e.
Oaxaca	5,164	25.04	86.5	53.8	68.9	80	8.55	nw.	e.
Tuxpan (Vera Cruz).	....	30.11	95.5	70.0	80.1	84	18.08	nw.	w.
Zacatecas	8,015	22.50	76.1	47.1	58.8	73	6.07	e.	e.
Zapotlan (Seminario)	5,078	....	79.3	60.8	68.4	76	12.40	se.	se.

METEOROLOGICAL OBSERVATIONS AT HACIENDA PERLA, PUERTO RICO.

By Capt. ARTHUR C. HANSARD.

The Weather Bureau is indebted to Capt. Arthur C. Hansard, Manager of the Hacienda Perla, Province of Numacao, Puerto Rico, for a meteorological record from which the accompanying climatological tables illustrating the weather of that province have been compiled by Mr. A. J. Henry, Chief of Division of Records and Meteorological Data. Hacienda Perla is on the northeastern shore of the island at an elevation of 460 feet above the sea and about an hour's drive therefrom, in latitude 18° 21′ N., longitude 65° 42′ W., approximately.

The thermometers in use — maximum and minimum — were verified at Kew and again at New York and San Juan. They are placed in an open balcony, 12.5 feet above ground, shaded from the sun and facing the prevailing wind (northeast).

The rain gauge is of standard make, exposed in the open with the top of receiver 3 feet and 2 inches above ground.

The average rainfall for the two and a half years was 123 inches, about twice as much as falls at San Juan at sea level. The record, although covering but a short time, exhibits many of the characteristics common to the West Indies. February and March are the driest months. Heavy rains begin in May, a month earlier than in western Cuba, and continue with a slight weakening in June and October until the end of the year.

The temperature at Hacienda Perla is slightly lower than at San Juan, as might be expected, on account of the greater elevation of the former. The highest point reached by the thermometer was 95° in May, 1898; the lowest, 61° in January, 1897, and February, 1898. On the maximum temperature Captain Hansard remarks: "The highest, 95°, during May, 1898, was phenomenal and occurred on only two days; in fact I have only noted 92° on two days, and 93° on one day."

MEAN TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ..	......	......	......	......	......	......	......	80 0	80.1	80.2	76.3	73.2	......
1897 ...	75.3	71.2	74.2	76.3	78.5	80.0	79.2	80.4	79.6	79.2	76.3	75.6	......
1898 ...	74.4	73.1	74.2	75.2	79.0	78.2	76.5	79.0	79.2	......	......	......	......
Av'ge.	74.8	72.2	74.2	75.8	78.8	79.1	77.8	79.8	79.8	79.7	76.3	74.4	76.9

MEAN OF MAXIMUM TEMPERATURES.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	75.0	....	......	......	......	......	......	86.0	87.1	88.0	81.2	82.1	......
1897 ...	80.3	78.0	81.1	82.2	84.1	88.3	85.1	87.1	87.1	87.0	83.0	82.2	.....
1898 ...	80.1	80.2	82.9	83.1	87.0	86.2	84.2	85.1	86.3	......	......	......	......
Av'ge.	78.5	83.6	82.0	82.6	85.5	87.2	84.6	86.1	87.1	87.5	82.1	82.2	84.1

MEAN OF MINIMUM TEMPERATURES.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	69.0	......	......	......	......	......	......	73.0	73.0	73.1	70.1	69.0	.....
1897 ...	66.1	67.0	68.1	70.0	73.1	73.2	74.0	76.1	72.2	72.0	70.1	69.1	......
1898 ...	69.1	65.2	65.2	66.0	73.1	72.1	71.2	72.0	72.2	......	......	.....	......
Av'ge.	68.1	66.1	66.6	68.0	72.6	72.6	72.6	73.7	72.6	72.6	70.1	69.0	70.4

ABSOLUTE EXTREMES: MAXIMUM TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	80	81	78	......	......	.....	......	87	92	93	85	85	93
1897 ...	86	84	84	87	89	90	89	92	90	91	86	84	92
1898 ...	85	85	85	87	95	92	89	87	93	......	......	......	95
Max...	86	85	85	87	95	92	89	92	93	93	86	85	95

ABSOLUTE EXTREMES: MINIMUM TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	64	62	64	......	......	......	......	72	71	70	67	65	62
1897 ...	61	65	65	68	69	71	72	72	71	71	65	65	61
1898 ..	66	61	64	65	71	70	66	67	70	......	......	......	61
Min...	61	61	64	65	69	70	66	67	70	70	65	65	61

TOTAL RAINFALL.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	4.54	3.32	4.19	5.34	10.44	7.85	13.33	16.98	12.26	6.53	23.08	11.59	122.95
1897 ...	13.16	2.87	3.67	13.73	32.89	3.98	10.45	7.62	10.36	11.56	16.17	9.77	136.18
1898 ...	6.81	2.50	5.27	2.98	7.62	8.84	18.40	12.87	9.93	......	......	......	.....
Av'ge.	8.17	2.90	4.38	7.35	16.98	6.87	14.06	12.49	10.85	9.04	19.62	10.68	123.39

NUMBER OF DAYS WITH .01 INCH OR MORE OF RAIN.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	21	16	22	17	26	21	30	24	25	23	28	26	279
1897 ..	19	12	12	17	26	16	25	22	20	21	28	27	245
1898 ...	20	13	17	15	12	18	26	15	20	......	......	......	......
Av'ge.	20	14	17	16	21	18	27	20	22	22	28	26	251

GREATEST RAINFALL IN 24 CONSECUTIVE HOURS.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	0.59	0.80	1.05	1.56	1.91	2.31	3.65	8.70	2.12	1.56	5.45	1.24	......
1897 ...	6.20	0.61	1.30	2.80	4.13	1.38	1.76	1.90	1.91	2.00	4.32	1.07	......
1898 ...	1.10	0.83	1.37	0.72	2.30	3.40	2.61	4.20	2.71	......	......	.....	......
Max..	6.20	0.83	1.37	2.80	4.13	3.49	3.65	8.70	2.71	2.00	5.45	1.24	......

OBSERVATIONS AT RIVAS, NICARAGUA.

The records contributed for many years by Dr. Earl Flint, at Rivas, Nicaragua, include barometric readings. His present station is at 11° 26′ N., 85° 47′ W. The observations at 7:17 a. m., local time are simultaneous with Greenwich 1 p.m. The altitude of his barometer is 36 meters above sea level, but until the barometer has been compared with a standard it seems hardly necessary to publish the daily readings. The wind force is recorded on the Beaufort scale, 0–12. When cloudiness is less than $\frac{1}{10}$, the letter "F," or "Few," is recorded.

This station is situated on the western shore of Lake Nicaragua, not far from the eastern end of the western division of the Nicaragua Canal. The volcano Ometepe, on an island in Lake Nicaragua, is about 10 miles northeast of the station. Mr. Flint's records occasionally mention the presence of clouds in the early morning on the summit of this mountain.

Observations at Rivas, Nicaragua, August, 1898.

OBSERVATIONS AT 7 A. M. LOCAL (8 A. M. EASTERN STANDARD) TIME.

Date.	Temperature.		Wind.		Upper clouds.			Lower clouds.			Daily rainfall.
	Air.	Dew-point.	Direction.	Force.	Kind.	Amount.	Direction from.	Kind.	Amount.	Direction from.	
	°	°									
1	78	72	ne.	0	ck.	4	ne.	....	......	....	0.00
2	79	75	ne.	0	ck.	6	ne,	....	......	....	0.00
3	78.5	73	ne.	1	....	......	....	kc.	3	ne.	1.00
4	76	73	se.	0	....	......	....	k.	7	se.	0.00
5	78	74	se.	0	....	......	....	k.	10	se.	0.53
6	77	74	sw.	0	ck.	7	se.	....	......	....	0.00
7	79	75	se.	2	csk.	10	se	....	......	....	0.80
8	79	73	se.	2	....	......	....	k.	Few	se.	0.00
9	79	73	se.	1	c.	3	sw.	k.	7	se.	0.00
10	79	73	se.	1	ck.	5	se.	....	......	....	0.00
11	78	72	se.	0	c.	4	se.	k.	4	se.	0.20
12	78	72	se.	2	c.	10	se.	k.	10	se.	0.00
13	78	75	se.	1	ck.	7	se.	k.	7	se.	1.71
14	75	74	se.	0	ck.	7	se.	k.	5	se.	0.80
15	75	73	s.	0	....	......	....	k.	5	se.	0.08
16	77	74	ne.	0	ck.	Few	ne.	....	......	....	0.00
17	78	75	se.	0	....	......	....	n.	10	se.	0.00
18	77	72	se.	0	c.	6	se.	....	......	....	0.00
19	77	72	se.	0	c.	1	se.	....	......	....	0.00
20	77	74	se.	0	....	......	....	k.	7	se.	0.00
21	75.5	73	sw.	0	....	......	....	n.	10	sw.	3.15
22	76	73	se.	0	....	......	....	k.	5	se.	0.40
23	77.5	73	se.	0	ck.	9	se.	....	......	....	0.60
24	78	74	se.	1	....	......	....	ks.	6	se.	0.04
25	78	74	se.	0	....	......	....	ks.	10	se.	0.37
26	76.5	75	se.	0	ck.	5	se.	....	......	....	0.00
27	76	74	s.	0	....	......	....	k.	10	se.	0.00
28	76	73	sw.	0	ck.	10	se.	....	......	....	0.40
29	75	72	se.	0	....	......	....	n.	10	se.	1.77
30	77	74	se.	2	c.	7	se.	....	......	....	0.00
31	78	74	sw.	1	c.	10	se.	....	......	....	0.00
Means ..	77.8	......	......	......	....	......	....	....	......	....	11.85

OBSERVATIONS AT 8 P. M. LOCAL (9 P. M. EASTERN STANDARD) TIME.

Date.	Temperature.		Wind.		Upper clouds.			Lower clouds.		
	Air.	Dew-point.	Direction.	Force.	Kind.	Amount.	Direction from.	Kind.	Amount.	Direction from.
	°	°								
1........	78.5	74	ne.	1	....	......	....	ks.	10	ne.
2........	78	74	ne.	1	c.	10	ne.	....	......	....
3........	79	75	se.	0	....	......	....	k.	9	se.
4........	77	73	se.	0	....	......	....	k.	10	se.
5........	78.5	74	se.	0	....	......	....	k.	10	se.
6........	79	75	se.	0	....	......	....	k.	10	se.
7........	78	75	se.	0	....	......	....	k.	10	se.
8........	79	75	se.	2	cs.	10	se.	k.	10	se.
9........	79	74	se.	1	....	......	....	ks.	10	se.
10	79	75	se.	0	....	......	....	ks.	10	se.
11........	79	76	se.	1	....	......	....	ks.	10	se.
12........	78	75	se.	1	....	......	....	k.	10	se.
13........	75	74	s.	1	....	......	....	k.	10	s.
14........	76	73	se.	1	....	......	....	k.	10	se.
15........	77	73	se.	1	....	......	....	k.	10	se.
16........	79	75	se.	0	....	......	....	k.	5	se.
17........	78	75	se.	0	....	......	....	k.	10	se.
18........	78	75	se.	0	....	......	....	k.	4	se.
19........	80	74	se.	0	....	......	....	k.	10	se.
20........	79	75	se.	0	....	......	....	ks.	4	se.
21........	78	75	sw.	0	....	......	....	k.	10	se.
22........	79	75	se.	0	....	......	....	k.	Few	se.
23........	77	73	se.	0	....	......	....	k.	10	se.
24........	78	75	se.	1	....	......	....	k.	Few	se.
25........	79	75	se.	0	c.	5	se.	....	......	....
26........	78	75	se.	0	....	......	....	k.	10	se.
27........	77	73	se.	0	ck.	10	se.	....	......	....
28........	78	75	se.	0	....	......	....	ks.	10	se.
29........	78	75	se.	0	ck.	Few	se.	....	......	....
30........	79	75	se.	0	ck.	Few	se.	....	......	....
31........	78	75	sw.	1	ck.	Few	se.	....	......	....
Means........	78.2	......	......	......	....	......	....	....	......	....

QUANTITY OF RAINFALL CORRESPONDING TO GIVEN DEPTHS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

It is sometimes necessary to know the total quantity of water corresponding to given depths of rainfall over an acre or a square mile. An acre, it will be remembered, contains 43,560 square feet or 6,272,640 square inches, over which area

a rainfall of an inch in depth would equal 6,272,640 cubic inches of water, and we may convert the latter into gallons, barrels, or tons, as we please.

We recently computed for publication in the Year Book of an Agricultural Journal, a table giving the quantity of water corresponding to different depths of rainfall. A correspondent offers the criticism that the wine gallon of 231 cubic inches should have been used instead of the imperial (British) gallon of 277.463 cubic inches, as the former is the legal standard in the United States and the one commonly in use. We have, therefore, recomputed the table, giving the number of gallons per acre corresponding to given depths of rainfall in both measures for the convenience of all concerned. One inch of rainfall = 22,607 imperial gallons per acre, or 27,154 United States gallons.

Quantity of rainfall corresponding to given depths.

Depth of rainfall.	Cubic inches per acre.	Gallons per acre.		Ton per acre (2,000 pounds).
		United States or Queen Anne.	I perial (British).	
Inches.				
0.25	1,568,160	6,789	5,652	28
0.50	3,136,320	13,577	11,303	56
0.75	4,704,480	20,366	16,955	85
1.00	6,272,640	27,154	22,607	113
1.25	7,840,800	33,943	28,259	141
1.50	9,408,960	40,371	33,911	170
1.75	10,977,120	47,520	39,563	198
2.00	12,545,280	54,309	45,214	226
2.25	14,113,440	61,097	50,866	255
2.50	15,681,600	67,886	56,517	283
2.75	17,249,760	74,674	62,169	311
3.00	18,817,920	81,463	67,821	339
4.00	25,090,560	108,617	90,428	452
5.00	31,363,200	135,772	113,085	565
6.00	37,635,840	162,926	135,642	678

The United States gallon adopted by Congress in 1830 is identical with the wine gallon of Queen Anne. The latter as well as the Winchester corn-gallon of 274¼ cubic inches, and the standard ale gallon of Queen Elizabeth of 282 cubic inches, were abolished as standard measures of capacity in Great Britain in 1824, when the new imperial standard gallon containing 10 pounds weight of water at temperature 62° F., barometer 30 inches, was made the standard of capacity for liquid measures. At the same time a cubic inch of distilled water, weighed in air by brass weights at the temperature of 62° F., the barometer being at 30 inches, was declared to contain 252.458 grains, thus making the contents of the imperial gallon 277.274 cubic inches.

A redetermination of the weight of a cubic inch of distilled water at the Board of Trade, Standards Department, London, 1889, by Mr. H. J. Chaney (Philosophical Transactions of the Royal Society of London, Vol. 183 A., pp. 331–354), gave 252.286 grains as the true weight, instead of the hitherto accepted value of 252.458, whence it follows that the capacity of the imperial gallon is 277.463 cubic inches, and the number of gallons per acre = $\frac{6,272,640}{277.463}$ = 22,607, as above.

The figures in the last column, tons per acre, were obtained by reckoning 200 imperial gallons to the ton of 2,000 pounds.

COLONEL CHILDS' RECORD OF RAINFALL IN NICARAGUA.

Through the kindness of Rear-Admiral John G. Walker, United States Navy, president of the Nicaragua Canal Commission, the Weather Bureau has obtained a copy of the record of rainfall in Nicaragua, September 9, 1850, to September 25, 1851, made in connection with the survey of the Nicaragua route for a ship canal, by Col. O. W. Childs, civil engineer. This record has often been referred to, but we are not aware that it has ever before been made available to meteorologists, and we therefore publish it in full.

The original manuscript states:

The observations were taken at Rivas de Nicaragua from September 9, 1850, to March 11, 1851, and from the latter period to September 25 of the same year, they were taken on the San Juan River.

The rainfall was carefully ascertained by means of a rain gauge. The observations were in all cases taken by a member of the party, except during a term of thirty-four days in September and October, 1850, when they were taken by Don Fruita Chomorro, then prefect of that department of the state.

It is not likely that the missing days in September, 1850 and 1851, will materially affect the monthly totals; but, in order that a summary for exactly one year may be obtained, the following data were given in Colonel Childs' manuscript:

Summary for one year, from September 9, 1850, to September 8, 1851.

Whole number of days on which rain fell	139	
Whole number of days on which no rain fell	226	
From May to October, the wet season, there fell	90.88	inches
From November to April, the dry season, there fell	6.55	"
Greatest fall in any one month (July, 1851)	22.54	"
Least fall in any one month (February, 1851)	0.00	"

The rainfall is almost invariably by showers of short duration, which occur in the latter part of the day and in the night.

In the following table a bracket indicates that the rainfall of two days is given in one measurement. The blank spaces at the beginning and end show those dates for which there is no record. The time of day at which the record was made daily is not mentioned, but was presumably at some early hour, in accordance with universal custom.

Precipitation at Rivas and San Juan River, Nicaragua.

	1850.				1851.								
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	...	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.03	0.00
2	...	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09	2.71
3	......	2.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	{0.96	4.71
4	.....	0.03	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.46	{0.60		0.00
5	......	0.29	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.92		1.32	0.64
6	......	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95	0.77	0.00
7	......	0.00	0.31	0.60	0.00	0.00	0.00	0.00	0.00	0.35	0.49	0.00	0.16
8	.....	0.00	0.00	1.27	0.00	0.00	0.00	0.00	0.00	{0.73	0.72	{1.26	0.00
9	{0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.25	0.00		0.70		0.30
10		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	{1.23	1.51	0.00
11	0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.00	0.66	0.06		0.54	0.00
12	0.44	1.30	0.02	0.00	0.00	0.00	0.00	0.00	0.66	0.24	2.65	0.63	1.11
13	0.06	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.04	0.00
14	0.75	1.90	0.00	0.49	0.00	0.00	0.00	0.00	0.13	1.38	0.07	0.00	0.00
15	0.00	2.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.82	0.22	0.49	0.00
16	0.26	2.79	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.16	0.58	0.64	0.00
17	0.26	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.78	0.00	0.00
18	0.31	1.15	0.00	0.35	0.00	0.00	0.00	0.00	0.14	0.00	{0.19	0.05	0.47
19	1.03	0.04	0.18	0.00	0.00	0.00	0.00	0.00	{0.92	0.35		0.00	1.72
20	0.09	0.14	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.52	0.53	0.00
21	0.93	0.01	0.00	0.00	0.19	0.00	0.12	0.00	0.27	0.99	0.00	0.00	0.00
22	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.03	0.00	1.34	0.24	0.27
23	0.19	0.00	0.00	0.00	0.00	0.00	{0.55	0.00	0.12	0.71	0.00	0.00	0.08
24	0.00	1.74	0.00	0.00	0.00	0.00		0.00	0.00	0.00	{0.45	1.01	0.00
25	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.09		0.00	0.07
26	0.00	2.04	0.00	0.14	0.00	0.00	0.00	0.00	0.76	0.10	5.92	0.50	.....
27	0.23	0.00	0.04	0.00	0.00	0.00	0.47	0.00	0.42	0.83	0.41	0.61	......
28	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	2.77	{0.52	0.09	......
29	1.60	0.07	0.60	0.00	0.00	......	0.00	0.00	0.13	0.30		0.50	......
30	0.38	0.69	0.00	0.00	0.00	......	0.00	0.18	0.27	1.39	2.29	0.00	......
31	......	0.00	......	0.00	0.00	......	0.00	.....	0.25	......	0.51	0.00	......
Sums	7.00	17.86	1.39	3.21	0.38	0.00	1.14	0.43	9.14	14.31	22.54	11.81	12.24

SEVERE HAILSTORM IN MISSOURI.

Communicated by A. E. HACKETT, Section Director, Columbia, Mo.

Mr. J. R. Brink, voluntary observer at Maryville, Mo., sends an account of a hailstorm of unusual violence that occurred on September 5, in Nodaway County, on the northern border of that State. The path of the hailstorm was about three miles wide; it extended far to the westward and moved due eastward for 18 miles across Nodaway County to One Hundred and Two River where it suddenly stopped. From the newspaper accounts it appears that the hail was heavy enough

to do much damage throughout this entire region, but that the greatest destruction occurred about 4 miles east of Clearmont, over a region of about 4 square miles, as indicated on the accompanying map. Mr. Brink states that at one point in this region the fall of hail was so heavy that a drift unprotected by any artificial means remained lying on the ground for four weeks after the storm, and this too at a season of the year when the soil had a comparatively high temperature. Mr. Brink, leaving Marysville, visited the region where the storm occurred, just four weeks after September 5, and secured several excellent photographs of the scene. Even at that time he found the people of the neighborhood gathering the hail for the purpose of making ice cream. Pieces of ice had been picked up at the time of the storm of a cylindrical form of about four inches long by about two and a half in diameter. We reproduce on Chart XVI, Fig. *a*, a photograph showing how complete had been the destruction of growing corn. The stalk seen in the photograph was quite mature, and is the only one left standing in a field of 80 acres. Had it not been for the hailstorm, this field would have yielded 60 bushels to the acre when harvested in the middle of September. The half tone, Chart XVI, Fig. *b*, shows the complete destruction of the foliage in a grove of young trees. Of course, the falling cakes of ice destroyed the roofs and even the sides of the houses, sometimes the north and sometimes the north and west sides at Clearmont; when its force was not sufficient to make a fresh hole through the boarding, the hail would generally, at least knock out the knot holes. The northern edge of the storm seems to have passed about ten miles north of Maryville; but 2 or 3 miles farther north a narrow strip of country also suffered severely; see Chart XVI. The statement that in some places the earth was covered to the depth of a foot, while everywhere it was white with ice, seems to justify the conclusion that there must have been an average depth of from 4 to 6 inches over the central region of, at least, 4 square miles in area.

THE TELEGRAPH SERVICE WITH THE WEST INDIES.

By J. H. ROBINSON, Chief of Division.

Daily telegraphic weather reports from the West Indies, Central and South America, and the Mexican Gulf Coast are now received at the Central Office of the Weather Bureau, i. e., from Nassau, Habana, Santiago de Cuba, Kingston, Santo Domingo, San Juan, St. Thomas, St. Kitts, Dominica, Martinique, Barbados, Trinidad, Curaçoa, Colon, Coatzacoalcos Vera Cruz, Tampico, and from Merida when the conditions are threatening. Daily reports are also received from Bermuda. For details as to routes of submarine cables over which reports are transmitted, see Chart XIII, showing points at which the cables connect with the land lines.

During the entire duration of the recent war with Spain daily weather reports were regularly received at the Central Office of the Weather Bureau from Habana. The observations were taken by the observers of the Spanish Meteorological Service for the Antilles, and were telegraphed by their operators to Key West, where they were retelegraphed to Washington. The submarine cable from Key West to Habana remained intact during the entire war, as did also the cable from Santiago de Cuba to Kingston, Jamaica. As the Key West–Habana cable had its outlet through the United States, it was not deemed wise to disturb it; the Santiago de Cuba–Jamaica cable, however, was grappled for, but not caught.

In connection with this article, perhaps it would be of interest to know that the Weather Bureau observers on the seacoast in many instances rendered efficient service to their country by reporting passing vessels, one of the most important being the arrival of the *Oregon* off Jupiter, Fla.

WEATHER TYPES AT HAVRE, MONT.

By C. W. LING, Observer, Weather Bureau (dated October 10, 1898).

I forward herewith a few generalizations relative to the marked pressure conditions that produce certain weather in this vicinity as deduced from a study of the daily weather maps for the past two years. The cause of the warm southwest chinook winds that prevail here is easily explained to visitors as due to mechanical or dynamic heating, and the old Japan current theory, still held by many, is easily obliterated. The conditions preceding cold waves, or colder weather, are very well marked and invariably produce the expected cold weather, with high northwest winds.

Chinook conditions.—A high over Wyoming and southern Idaho, with a low pressure over northern Montana, invariably brings to Havre a dynamic rise in temperature, i. e., a chinook wind in winter and a warmer spell of weather in summer, and accompanied by high southwest winds.

Cold wave conditions.—A low barometer over Wyoming, Utah, and southern Idaho, with high over northern Montana, Alberta, and Assiniboia, indicates intensely cold weather for Havre in winter and much cooler in summer. A high pressure area, with the low in Wyoming, by its vertical action, draws down intensely cold air from above (see journal of December 1 and 2, 1897, and of March 25, 26, 27, 1898). These conditions produce cold, high, northwest winds.

The summer type of weather conditions in Oregon, i. e., a high over Washington and Oregon with a low over the northern part of Montana and southern Alberta, indicates a warm spell for Havre and vicinity (see data July 13 to 17, 1898).

A falling barometer after a dry and warm spell of weather, barometer falling below the normal, with falling temperature, with the forecast for warm, indicates a heavy June or July rain in a day or two; also a cool atmospheric wave, followed by a warm wave (see thermograph sheet July 18 to 19, 1898, and the precipitation on those dates).

A low pressure area of 29.7, or lower, extending west to the coast and far south, indicates for Havre two or three days of rain or snow.

ANEROID BAROMETERS.

By C. F. MARVIN, Professor of Meteorology (dated November 8, 1898).

The unreliability of aneroid barometers when anything like accurate measures of pressure are required is almost proverbial. It is evident that much work remains to be done in order to ascertain the laws governing the irregular action of this most convenient and, in some cases, indispensable type of barometer. It will be still better if we can ascertain and eliminate the real causes of the anomalous behavior. The face reading of an aneroid even when not compensated for temperature is often thoughtlessly accepted with every confidence as to its infallibility, but it is pretty generally understood among the more critical observers that aneroids require to be frequently checked and verified by comparison with standards, and that a slow change goes on within them after they have been subjected to a considerable change in air pressure.

It may be stated that, broadly classified, the inherent errors of all aneroids are of two kinds. When the instrument is exposed over long periods to only such pressure changes as occur at any station at the earth's surface from day to day, its error will remain sensibly constant for a considerable period of time, but from time to time relatively large changes may and generally do take place in this error without any apparent cause and can not, therefore, be duly allowed for. The other inherent error is an effect connected with any considerable change in pressure. Suppose, for example, the pressure is changed in a short space of time from 30 to 25 inches; at the instant the pressure becomes stationary the index of the aneroid will show a certain read-

ing, but instead of remaining stationary with the pressure, it continues moving slowly downward over the scale showing a lower and lower reading as time progresses. This after effect is called "creeping;" it is analogous to the slow change in the zero of a thermometer and varies greatly under different circumstances and has been observed to increase during several days or even weeks. Its amount in a given barometer depends among other things upon how much and how rapidly the pressure has changed and whether the change was continuous or not. Finally, if the pressure is restored to its initial value, the index will fail to return immediately to the original reading, but will slowly creep toward it. These errors are separate and distinct from errors of graduation, or the effects of temperature and friction, or those depending upon what position is given the aneroid, all of which latter can be more or less perfectly disposed of. From the foregoing it necessarily follows that the readings carried up and down mountains or sent up with kites and balloons are subject to a series of errors which it is practically impossible to determine with any degree of exactness.

A most valuable series of experiments upon the aneroid has been published by Dr. C. Chree, Superintendent of Kew Observatory, whose paper on this subject, entitled Experiments on Aneroid Barometers at Kew Observatory and their Discussion, has recently appeared in Philosophical Transactions, Series A, vol. 195, 1895. The author's object, as he states, is "to acquire knowledge likely to increase the usefulness of the aneroid under the conditions in which it is actually employed."

In the execution of this object the tests of hundreds of aneroids, made during many years for the makers, at the Kew Observatory, were exhaustively discussed and other special tests were made to develop the law of the after effect or *creep*. Dr. Chree's analysis is most comprehensive and complete, and leaves little to be desired, but in the present writer's estimation, the fair conclusion to be drawn from the investigation is that the errors of all ordinary aneroid barometers are hopelessly involved in a complex law, so that under the complex conditions of use it is impossible, or at least impracticable to satisfactorily predict or determine the errors of a given instrument. Among other writers on this question may be mentioned Lovering, Proceedings American Academy of Sciences, 1849, Vol. II; also American Journal of Science, 2d Series, Vol. IX, p. 249: Balfour Stewart, B. A., Report, 1867; also Proceedings Royal Society, Vol. XVI, 1869; Philosophical Magazine, Vol. XXXVII, 1869: Whymper, How to Use the Aneroid, John Murray, 1891, and Carl Barus, American Journal of Science, Vol. I, 4th series, 1896.

Lovering, Stewart, and Whymper may be said to have observed and recorded the facts relative to the errors of aneroids. Dr. Chree has gone a step further and formulated the approximate law of error. Unfortunately this law appears to be too complex and involved to become practically useful. What still remains to be done is to definitely ascertain the cause of the difficulty, and if this can not be quite largely eliminated by an improved construction we must then invent some new and better type of instrument. A step in this direction has been taken by Prof. Carl Barus, whose countertwisted curl aneroid, he claims, is practically free from the after effect and similar errors common to other forms of aneroid. The experimental forms investigated by Professor Barus are very delicate pieces of laboratory apparatus, and are scarcely available for practical work. The "countertwisting" is, however, a new feature, and may yet prove to be of great value in practical instruments.

The present writer has given some thought to this problem from time to time, but no opportunity has been offered for making any new investigations. It seemed to me that the real seat of the greater part, if not all of the after effect or creeping, is in the corrugated aneroid vacuum boxes themselves, as distinguished from the tempered steel springs that are employed to keep the box from collapsing under the pressure of the air. This conviction was forced upon my mind after reading Mr. Whymper's valuable paper on the errors of the aneroid, and in 1892 I made the following simple experiment, which greatly confirmed this supposition: The vacuum box of an old aneroid was removed, and a heavy weight (a trifle over 50 pounds was required) was applied directly to the steel spring, thereby straining it as nearly as possible to the same extent as did the air pressure exerted through the medium of the corrugated vacuum box. Any desired changes in the position of the index were made by appropriate changes in the weight. No after effect comparable in magnitude with that exhibited by ordinary aneroids was ever observed. In other words this tempered steel spring behaved to all intents and purposes as if it were a *perfectly* elastic body. Readings of the pressure scale could be made corresponding to about 0.005 of an inch on the barometer. A careful or full investigation was not attempted. I believe nevertheless that the tempered steel springs employed in all aneroids are or may easily be made to be highly trustworthy. On the other hand the process of constructing the vacuum boxes is well calculated to develop therein irregular and imperfect elastic properties in the highest degree. The top and bottom surfaces are each formed of a thin circular sheet of metal, with a narrow rim bent up around the edge. In order to give flexibility several concentric corrugations are formed over quite the whole face of the disk. The crimping and bending operations necessary in the manufacture of these corrugated disks have a marked effect upon the elastic qualities of the metal, which to make matters worse is generally of brass, german silver, or some similar alloy well known to be only imperfectly elastic under the most favorable conditions. The metal must originally be, more or less, in a soft and annealed condition in order to withstand the corrugating and bending operations. Those portions which are stretched and compressed by the process become stiffer and more elastic, and the finished disk is permeated by a most complex and irregular system of internal strains. The arrangement of molecules is undoubtedly a highly unstable one, and it is not surprising that large, discontinuous, and unexpected changes take place in the readings of the finished instrument.

In 1896 I had occasion to design a meteorograph suitable for use on the kites recently employed by the Weather Bureau in making aerial observations. The lightest possible form of barometer of the aneroid type was an obvious necessity. The considerations outlined above led me to substitute steel in place of brass for the vacuum boxes, and a preliminary effort was made to profit if possible by the results brought out by Professor Barus. Mechanical difficulties in securing a satisfactory form of recording aneroid on these lines forced me however to abandon this attempt at the time and adopt a type of instrument similar to the well known Richard barograph. The vacuum boxes were made of steel instead of composition metal. The performance of these barometers, although better generally than brass instruments, has disappointed my expectations, as they have exhibited considerable after effect, which I am still convinced is due primarily and largely to the imperfect elastic properties of the boxes themselves. Boxes of small diameter were necessarily adopted, but these are inferior to those of large diameter. In support of this statement I find a very significant note in Dr. Chree's paper, p. 446, stating that the after effect in 30 barometers of special make and large size (how large is not stated) as tested at Kew, was so exceptionally small that he found it necessary to multiply the actually observed effects by seven in order to make the figures similar in size to corresponding results from ordinary aneroids.

In concluding these remarks attention is called to a certain source of error in testing aneroids that does not appear to have been mentioned hitherto, and if not noticed or guarded against may have an appreciable effect on results. Any sudden change in the air pressure under the receiver of a pump inevitably heats or cools the gas dynamically, in consequence of which there is a most pronounced and real "after effect" in the pressure of the air within the receiver. In my own experience I have been very greatly surprised at the slowness with which the gas acquires its stationary temperature and the magnitude of this effect on the resulting stationary pressure. The slow rate of pressure change adopted by Dr. Chree, namely, one inch in five minutes, in all probability eliminates any error of this kind, but the point is not mentioned, and it is just possible that the results of the older observations and of investigations made without due regard for this effect may be somewhat in error in consequence.

NOTES BY THE EDITOR.

THE OMAHA CONVENTION OF WEATHER BUREAU OFFICIALS.

On several previous occasions conventions of Section Directors of State Weather Services have been held, to the great advantage of the individuals and the Service, and it was, undoubtedly, a wise innovation when the Chief of the Weather Bureau decided to expand this idea and call for a general convention of Weather Bureau officials of every grade. The convention was of a thoroughly cosmopolitan character, every section of the country was represented, and every class of men. There was a large sprinkling of voluntary observers, an encouraging number of the younger employees, and several of the oldest and most venerable. Three men were present from the class of 1871, but the classes that were most prominently in evidence were those of 1881–83. The official report will show that the long programme was attacked and faithfully followed up, although the work had to be done too rapidly for comfort, owing to the loss of a day. The photograph of the group of seventy members remains as a visible embodiment of the fraternal intercourse, the social pleasures, and the intellectual profit of a meeting that will always remain vividly impressed upon the memories of all who were present as one of the most delightful events of official life. If it were not for the expense we are sure that every one would attend such a convention every year. Many inquiries were made for those who could not be present; both we and they lost much by their absence. The enthusiasm of all who took part in the discussions was remarkable; every one had some positive results of his own local experience to communicate for the benefit of the others. The diversity of ideas impressed one with the conviction that everywhere the work of the Weather Bureau is being adapted to special local conditions and that a hard and fast rule for the whole country would, oftentimes, work inconvenience or injury. One learned not to be so intolerant of the views of others and so positive that his own ideas will suffice for all occasions. The new devices submitted by Townsend of Philadelphia and Sims of Albany at their own expense and the new principle in meteorology brought forward by Hammon of San Francisco excited deep interest.

By its rather early adjournment the convention, unfortunately, missed the telegram inviting us to a special excursion to Lincoln, Nebr., where we should have inspected the relations of the Service to the State University. May we be more fortunate next time! In a few cases some general expression of opinion was uttered by the convention but, as a whole, the sentiment that pervaded it seemed to be to the effect that no business, properly so-called, need be transacted, as we were brought together at the call of the Chief to confer with him. Consequently, no vote was taken as to the time and place of the next meeting. that being a matter that can be left with Professor Moore; nevertheless, a hearty acclamation followed the pleasant rivalry between Hammon and Pague in advocacy of San Francisco, Cal., and Portland, Oreg., respectively. On the whole, the general conclusion must be that such conventions are essential to the welfare and strength of our meteorological service. Scattered as we are, widely over the whole country, we get but little opportunity for personal intercourse, we pursue our studies alone and with difficulty, little items of daily practice and of meteorological theory that would be quickly settled by conference with some neighboring observer, give us unnecessary trouble. The annual convention is a clearing-house, where we may balance accounts, discuss ideas, settle perplexities, dissipate the troubles of official life, burn our bridges, and take a new start.

THE WEATHER AND THE SUGAR CROP.

In the MONTHLY WEATHER REVIEW for August, 1897, page 354, we have given the general relation between annual rainfalls and sugar crops in the Island of Mauritius for the years 1880 to 1895, as quoted from the annual report of the Royal Alfred Observatory for the year 1895, by Mr. F. F. Claxton, who is now the director succeeding Dr. Meldrum who resigned September 30, 1896, on account of failing health, after a term of twenty-two years in the service. Since that date the reports for 1896 and 1897 have been received, from which we extract the following table showing the relation between the annual sugar crop of the whole island and the rainfall. The sugar crop is the result of the growth of the previous fifteen or eighteen months, beginning with the planting in September of the second year previous. The following table gives the total rainfall for those months during which the cane of the respective crops has been growing. It is an average for four stations, viz, Pamplemousses, Gros Bois, Cluny, and Union Bel-Air, which fairly represent the sugar districts:

Years of harvest.	Total sugar crop.	Rainfall during growth.
	Kilograms.	*Inches.*
1880	119,731,492	68.39
1881	117,809,610	78.68
1882	116,719,997	118.37
1883	120,396,858	84.03
1884	127,784,339	75.55
1885	115,299,030	77.13
1886	102,376,271	57.25
1887	124,073,140	86.18
1888	132,172,988	125.40
1889	124,564,951	108.71
1890	130,220,273	88.94
1891	113,813,075	96.61
1892*	68,718,573	98.78
1893	139,751,810	80.39
1894	113,793,319	88.11
1895	142,645,722	96.11
1896	152,677,973	108.58

* Destructive hurricane.

For the crop of 1897 the corresponding rainfall was the lowest on record, and in fact, scarcely one-half of the normal amount, and the sugar crop was exceedingly poor; but the exact figures are not at hand to be inserted in the above table. If we rearrange the above figures in the order of the

rainfall, as in the following table, we may perceive a clearer connection between the rainfall and the sugar crop than was shown in our previous article :

Years of harvest.	Total sugar crop.	Rainfall during growth.
	Kilograms.	*Inches.*
1886	102,376,271	57.25
1880	119,731,492	68.39
1884	127,784,339	75.55
1885	115,299,039	77.13
1881	117,809,610	78.68
1893	139,751,810	80.39
1883	120,396,858	84.03
1887	124,078,140	86.18
1894	113,793,319	88.11
1890	130,220,273	88.94
1895	142,645,722	96.11
1891	113,813,075	96.61
1892*	68,718,573	98.78
1896	152,677,973	108.58
1889	124,564,951	108.71
1882	116,719,997	118.37
1888	132,172,988	125.40

* Destructive hurricane.

By taking the means of these figures in groups we see that there has been a steady increase in the sugar crop which averaged 119 millions during the first four years and 137 millions during the last four years, which increase is undoubtedly due to an increase of acreage. On the other hand, the average for the four years of the least rainfall is 116 millions, and for the four years of greatest rainfall 131 millions. In these latter averages the secular increase, due to acreage, has little or no influence, and the difference of 16 million kilograms may be attributed to the increase of average rainfall from 70 inches to 115 inches during the growing season, so that an increase of three inches in the rainfall brings an increase of 1 million kilograms in the crop.

CORRECTION.

It is said that the Editor seems to have been unnecessarily severe in some remarks on page 316 of the MONTHLY WEATHER REVIEW for July. He was trying to show how to define the expression "very violent thunderstorm," so that the record would show whether the violence referred to the thunder and lightning, or the wind, or the rain or hail. He unintentionally misquoted the original report from Elgin, Ill. (where the measured rainfall was 0.43 inch), but he did not intend to say that a storm having so small a quantity as 0.043 inch might not be a very violent storm. If the expression "violent storm" is not misleading, it is, at least, possible to remove its indefiniteness by stating wherein the storm was violent.

The observer writes to say that 0.43 is the correct rainfall, "and the recollection of that stormy half-hour will linger in the memory of thousands in this city for a long time, so, also, will its marks continue on our shade and forest trees."

We infer that the measured rain fell within half an hour, which brings it up nearly to the standard of excessive rainfalls tabulated monthly by Mr. Henry in Table XI.

The Editor hopes that the observers will agree with him that it is better for him to venture on an occasional critical remark than not to remark at all.

INSTRUCTION IN RESEARCH.

It will be recognized by those who carefully consider the subject that progress in science consists not merely in the diffusion of what is already known, but in the actual increase of our knowledge. The grand structure called science has been the growth of many thousands of years. It is said that Pythagoras added to geometry his discovery of that important theorem which is now so familiar to every school boy, viz, that the square of the hypotenuse of a right-angled triangle is equal to the sum of the squares of the two sides. After geometry and algebra and arithmetic had been studied for two thousand years, the modern experimental sciences began to develop more rapidly. Newton and Galileo discovered the laws of forces and gave us the true basis for mechanics. Newton, also, made great strides in the study of the phenomena of optics. During the past century the names of Liebig in agricultural chemistry, Gauss in mathematics and magnetics, Kelvin in electricity, Clausius in thermodynamics, and a host of others each in his own sphere have become famous for the energy with which they have pushed their inquiries forward into the unexplored fields of nature. Our own land has had her Espy and Ferrel, but still stands in need of the help of many other equally sagacious investigators.

We hear much of the study of science in schools and colleges, and at last meteorology is also beginning to be appreciated as an important course of study; but can we be content to merely teach over and over again that which has been accepted as true? We are everywhere confronted with unexplained phenomena, with events that contradict all theories and hypotheses. We must hold ourselves open to conviction and ready to accept whatever new modification of old views may result from better investigations. But how shall we educate investigators?

A mistaken idea has widely prevailed that the investigator is a genius, born and not made; sent to us by the Creator, and not educated by human design. The history of German science has, however, shown that environment and training are as important as birth and inheritance. The whole system of education in the German universities has for five generations been directed to the development of the investigator as its highest product. Those who discover important new facts, laws, or principles have been rewarded with the highest places in the intellectual world of that nation. Those who feel that they have a desire or calling for scientific research are encouraged to study for the degree of doctor of philosophy, a degree that is only granted when the candidate has, by actual observation, experiment, or exploration, made some important contribution to human knowledge. The professors under whom he studies have, in their turn, made many similar contributions, and are well prepared to judge of the value of *his* work. Of course a considerable percentage of candidates fail to receive the desired degree of Ph. D., even after many years of persevering work; but still the German universities have, during the past seventy years, published over fifty thousand so-called "doctors' dissertations," embodying the results of the works of fifty thousand candidates. The consequence is that to-day Germany easily leads all the world in the amount and value of her contributions to human knowledge and the energy with which her students pursue the study of nature.

In a recent address by Sir Norman Lockyer (see Nature for October, 1898) he states that in 1845 in England there were no laboratories in the universities, no science teaching in the schools, no organization for training science teachers, and, he might have added, still less organization for training scientific investigators. The same was at that time true, approximately, of the United States, and in both countries the young men who wished to devote themselves to science were accustomed to resort to France or Germany to find the necessary educational facilities, stimulus, and companionship. Since those days both England and the United States have awakened to the necessity of encouraging scientific investigation and the training of investigators.

A great stimulus to the study of nature was given in America by the influence of Agassiz, at Cambridge, beginning with 1846, and by the opening of the Smithsonian Institution in 1847. Almost simultaneously independent work be-

gan at Philadelphia, Princeton, New Haven, Ann Arbor, Troy, Charlottesville, and possibly elsewhere.

The weekly journal Science, for August 19, 1898, says:

The development of the American university during the past twenty-five years may perhaps be regarded as the great achievement of the nation. The foundations laid at Harvard and at Johns Hopkins within the lifetime of those students now profiting from them have been built upon, until we have now a score of universities, as places for research, equal to Oxford, and half a dozen rivaling those of Germany. The American college, though founded upon the English system, was of native growth, and the university, based upon this college, though influenced by German methods, is distinctly national, while at the same time our different institutions show a marked individuality. The American university is definitely a place for research, where both teachers and students are engaged in research and in learning the methods of research. The results of the work of the students are in large measure summarized by the theses for the doctorates, and it is interesting to know what is the outcome of the past year's research.

It appears from a somewhat careful inquiry that 18 leading universities in 1898 conferred the degree of Ph. D. on a total of 234 candidates. The latter may be classified as those devoted to the humanities (91); to history and politics (38); to the sciences (105).

The weak point of the American custom in regard to these doctorates is that in many cases the theses are not published, so that we have no means of comparing either the candidates or the standards of the respective universities among themselves; but, in general, it is believed that heavier work is required of the candidates at Harvard and Johns Hopkins than elsewhere. We see from the preceding that the small force of men engaged in scientific research throughout the United States thus receives an appreciable addition every year. The editor of Science states that the distribution of these 105 theses, that is to say of the 105 scientific students, among the different sciences was as follows:

Chemistry	27
Psychology	18
Zoology	12
Mathematics	11
Physics	11
Botany	11
Geology	6
Physiology	4
Astronomy	3
Anthropology	2

Meteorology does not appear in this list. Its problems involve questions of astronomy, physics, and mathematics. The attainment of the degree of Ph. D. in the universities quoted by Science ordinarily means at least three years of general and again three of special work, the American university course is therefore longer, and, it is said, more thorough than the average course in Germany for attaining the same degree.

At the present time the fields of instruction and investigation are rapidly increasing. Meteorology is fully ripe for its share of attention. It is very desirable that the older men in the service who are studiously inclined should by teaching, or otherwise, contribute to the study of meteorology in the universities, just as they already have done in the schools and colleges. It is equally desirable that among the studious young men who are just entering the service, those who have a good foundation in mathematics and physics, should seek to attain the degree of "Ph. D. in meteorology" at the universities located in the cities where they are stationed. Any thesis prepared by a successful candidate for this degree would certainly be worthy of publication by the Weather Bureau. The present Chief has shown every willingness, and, indeed, a great desire to stimulate the intellectual and scientific growth of the corps. We should not be distinguished merely by our work but by our knowledge, and not by knowledge only but by our researches and our additions to knowledge.

Apropos of the above remarks Mr. F. O. Stetson, a graduate of the Massachusetts Institute of Technology, says:

Meteorology, like every other science, requires for its advancement careful study, original investigation, and research. This must be carried on by men familiar with the work already done in the same field, and acquainted with the principles of that and allied sciences; men whose mental equipment is at least equal to that of the college graduate who has devoted the major part of his time to the study of science. Those graduates who engage in original investigation are actuated by one or both of two motives; interest in their work, or the belief that additional learning or a doctor's degree will bring them higher salaries and larger incomes. It is probable that the first is the predominant motive in most cases. The average college graduate, if financially dependent upon his own exertions, is apt to be impatient at the time already consumed in preparation, and to consider that time and money spent in further study can bring no adequate pecuniary recompense. Our advanced student, then, whether fresh from "Class Day" or of more mature years, selects from his specialty that which has appealed most strongly to his fancy during his undergraduate course. Under these conditions it would be extraordinary if he chose meteorology. He may have completed the usual college course in physics, scarcely knowing that such a science exists. He may have diligently studied the laws of heat and the theories of gases, without learning of their connection with winds and rainfall. There is the chance that he may inadvertently do much for meteorology by the development of some interlinked branch of physics, but the progress of this science is heavily handicapped, owing to the fact that what is already known of it is not as yet generally recognized as a necessary part of the college curriculum. To those students whose graduate studies are solely for the benefit of their pocketbooks, meteorology is even less attractive. Many of this class expect to make teaching their profession, and it needs no mathematical demonstration to show that if a subject is not to be taught, no one will prepare himself to teach it.

Progress in meteorology will result from the continued teaching, over and over again and as widely as possible, of what is already known. As the elements of the science become more generally taught, it will appeal, as a fit subject for research, to an increasing number of graduate students of both classes.

INTERNATIONAL METEOROLOGICAL SYMBOLS.

In connection with the Circular of 1884, which is reprinted on page 312, MONTHLY WEATHER REVIEW, for July, Mr. A. L. Rotch calls attention to the fact that the thunder and lightning symbol was modified by the following resolutions of the International Meteorological Conference at Paris, 1896:

1. That the symbol T be added to the International Symbols adopted by the Congress of Vienna to indicate the days on which distant thunder has been heard, and conformably to the decisions of that Congress.
2. The symbol ϟ should be reserved for distant and diffused lightning, *wetterleuchten*, sheet lightning [or heat lightning.—Editor].
3. The symbol Tϟ should indicate all the cases where both thunder and lightning have been observed.
4. In the résumés the number of days of thunderstorms shall be, as far as possible, taken out separately for each of the three cases.

THE SECOND WELLMAN POLAR EXPEDITION.

Mr. Walter Wellman, leader of the Wellman Polar Expedition of 1898, took with him, as meteorologist and second in command, Mr. Walter B. Baldwin, Observer, United States Weather Bureau. Mr. Baldwin sends the following short letter to the Chief of the Weather Bureau:

S. S. FRITHJOF, CAPE TEGETTHOFF,
FRANZ JOSEPH LAND, *August* 2, 1898.

I have the honor to report that since the departure of this expedition from Tromsoe, Norway, June 26, meteorological observations have been made on board the steamship *Frithjof*, as follows:

At 7 a. m., 2 p. m., and 9 p. m., on temperature of the air (dry and wet bulb), temperature and salinity of sea-water; pressure of air (Weather Bureau aneroids Nos. 1134 and 1135, and ship's aneroid with attached thermometer); and velocity, whenever possible, of wind; kind and movement of clouds.

Marine barometer No. 488, obtained from the Chicago station, was found to be out of order and could not be repaired in time to be taken along; I, therefore, left it in its case, in care of Consul Andrew Aagaard, Agent of this Expedition, Tromsoe, Norway. The two aneroids are in good order, and I shall be able to make use of the barograph in connection with them, and expect to obtain good results therefrom.

I am now preparing to lead an advance party through Austria Sound, toward Cape Fligely, and will endeavor to obtain as accurate and full meteorological data as possible, a copy of which I will forward to you at the earliest possible moment.

Local time has been used in all cases of observations thus far, and in that connection I have also located position as accurately as possible to be obtained, much of the time in fog and ice.

In an accompanying letter of August 3, at the same place, Mr. Baldwin says:

We have decided to attempt to make our northing from this point, and as the *Frithjof* will soon leave us in pursuit of walrus, I have no alternative left but to give you an earnest of my intention. * * * We will have a long, hard pull for the next year, but when we hear from our friends a year hence, it will make up for all the hardships. Papers and letters sent to us in care of our Agent at Tromsoe, Norway, Consul Andrew Aagaard, should be posted about May 1, 1898. He will forward same by next year's steamer.

I suppose by the time we return you will have established several stations in Cuba.

RECENT EARTHQUAKES.

Prof. E. W. Morley, of Adelbert College, Cleveland, Ohio, reports that no seismic disturbance was recorded on his seismometer during August and September. Prof. C. F. Marvin reports the same with regard to the seismograph at the Weather Bureau in Washington.

Sunday, August 14, at Oak Point and several other places on the St. John River, N. J. The first shock was felt at 3:45 a. m., St. John local time, viz, about 3:09 a. m., seventy-fifth meridian time. The second shock was felt at about 3:50 a. m., local, or 3:14 seventy-fifth time. [1 p. m., St. John local time, is simultaneous with 12:24:16, seventy-fifth meridian time.] The shocks were preceded by a noise, and the first shock was sufficiently strong to overturn light objects and awaken people. It seems to have been felt most at Oak Point and vicinity (N. 45° 30′, W. 66° 05′).

Friday, September 16, Mr. T. B. A. Watson, of Hartington, Nebr., writes that at 3:59 a. m. (central time) a slight earthquake shock was felt at this place (Cedar County, N. 42° 40′; W. 97° 10′). The vibration seemed to be traveling from northeast to southwest; it shook every building, rattling the windows; the approach was preceded by a rumbling sound not unlike the roll of distant thunder, followed by a distinct shock lasting one second, then vibrations for about five seconds, then another shock similar to the first; the total duration was about ten or fifteen seconds (including the preliminary rumble?—ED.). Only one similar experience, viz, the slight vibrations at 5:45 a. m., February 4, 1896, is known to have occurred at this place.

Saturday, September 17, at Morrills Corner, 3 miles distant from Portland, Me., first shock at 10:54 a. m., lasting seven seconds, followed after an interval of eleven seconds by a second shock, lasting five seconds. This is the first earthquake at that place since February 17. It was recorded on a seismograph belonging to Mr. Robert Balch, who says that the first shock deflected the needle 0.09 inch, in a series of regular waves, and the second shock deflected it 0.07 inch in two sharp waves.

THE RAINFALL OF MAY IN JAMAICA.

According to the Jamaica weather report for May, 1898, the rainfall for the whole island was 85 per cent above the average.

This result has been chiefly attained by heavy rains between the 23d and 27th of May, due to a shallow cyclonic depression which traveled from west to east, northward of Jamaica. In the west of Jamaica the heaviest rainfall occurred on the 24th, and in the eastern portion of the island on the 25th. On an average between 5 and 7 inches fell on one or the other of these days all over the island, and in the cases of 13 stations which had during the month over 10 inches in one day, all but two occurred on the 25th in the east, and the 24th in the west. A phenomenal fall of 28.66 inches occurred at Cinchona Plantation on the 25th, concerning which special inquiry was made. The Superintendent, in reply, states as follows: "I beg to say there is no mistake whatever about the rainfall (28.66 inches) here on the 25th of May. We had to measure the rain three times during the day to prevent the gauge overflowing, and of course after measuring, the water was thrown away; it was not measured over a second time. We had steady heavy rain all day on the 25th; I don't think it ceased raining for five minutes during the twenty-four hours. During the night we had high winds which blew down a number of trees." It will thus be seen that the rate of fall was not excessive, being not much more than 1 inch an hour, but the fall continued at this rate for twenty-four hours, producing the phenomenal record for the day of 28 inches.

Although the rainfall for the whole island was 85 per cent above the average, and the rainfall at Cinchona quite unprecedented, yet, the average for the island was not so large as on several previous occasions. The following table gives the heavy monthly falls since 1870, viz, those months for which the average for the whole island exceeded 15 inches:

Year.	Month.	Rainfall.	Year.	Month.	Rainfall.
1870	May	17.38	1886	June	23.42
1870	October	16.74	1888	May	20.18
1879	October	15.69	1897	October	19.30
1885	December	15.60	1898	May	16.62

NOTE.—Editorial notes for which there was no room in the MONTHLY WEATHER REVIEW for September must be deferred to the next number.—ED.

METEOROLOGICAL TABLES AND CHARTS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

For text descriptive of tables and charts see page 366 of REVIEW for August, 1898.

TABLE I.—*Climatological data for Weather Bureau Stations, September, 1898.*

Stations.	Elevation of instruments: Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches: Mean actual, 8 a. m. and 8 p. m. ÷ 2.	Mean reduced.	Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. and min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Departure from normal.	Days with .01, or more.	Wind: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
New England.							63.6	+ 2.3										81	1.89	− 1.3										4.5	
Eastport	76	69	74	29.91	30.00	− .03	55.9	+ 0.1	80	6	63	39	21	49	24	51	48	82	2.93	− 0.2	9	6,026	s.	36	ne.	24	6	11	13	6.6	
Portland, Me	103	81	89	29.89	29.99	− .06	61.2	+ 1.5	87	3	70	41	21	53	26	55	52	77	3.48	+ 0.4	11	4,360	w.	30	nw.	27	13	13	4	4.2	
Northfield	872	15	65	29.11	30.04	− .03	59.0	+ 3.0	90	4	71	30	21	47	42	54	51	83	2.66	− 0.2	7	5,577	s.	42	sw.	4	8	11	11	5.9	
Boston	125	115	181	29.91	30.05	− .02	66.2	+ 3.8	92	3	75	44	21	57	28	59	56	74	1.93	− 1.0	6	6,880	w.	36	nw.	27	16	7	7	3.7	
Nantucket	14	43	54	30.04	30.05	− .05	65.2	+ 2.5	85	2	70	52	13	60	19	62	60	87	0.83	− 2.5	7	7,039	sw.	36	ne.	24	13	6	11	5.3	
Woods Hole	22	51	57	...	...	...	65.4	+ 2.4	82	2	70	46	21	60	17	...	...	...	0.76	− 2.4	6	9,937	sw.	42	nw.	27	21	2	7	3.4	
Vineyard Haven	...	20	...	...	...	...	67.4	+ 2.9	88	2	74	48	21	60	22	...	...	...	1.02	− 2.8	6	...	sw.	...	...	...	13	8	9	...	
Block Island	27	39	48	30.04	30.07	− .01	64.9	+ 1.3	84	1	70	49	25	60	15	61	59	82	0.96	− 2.0	6	9,697	sw.	55	ne.	24	18	6	6	3.5	
Narragansett	...	10	...	...	...	...	64.7	+ 2.5	90	*	73	39	21	56	29	...	...	...	1.99	− 1.2	7	...	w.	...	...	...	23	3	4	...	
New Haven	107	118	140	29.94	30.06	− .03	66.6	+ 3.1	93	3	76	42	21	57	26	61	59	79	2.30	− 1.4	8	5,431	sw.	36	nw.	2	19	4	7	3.2	
Mid. Atlan. States.							69.7	+ 2.7										76	2.34	− 1.5										3.8	
Albany	97	84	113	29.95	30.06	− .01	66.6	+ 3.5	94	1	77	40	21	56	30	59	56	77	1.61	− 1.8	9	4,534	s.	24	se.	22	15	8	7	4.2	
Binghamton	875	79	90	...	...	...	63.6	+ 2.6	93	1	75	36	21	52	37	...	...	...	2.70	− 0.6	9	3,367	w.	31	w.	6	11	11	8	4.8	
New York	314	298	326	29.74	30.07	− .02	68.9	+ 3.0	94	3	76	49	25	61	22	62	58	76	1.28	− 2.4	6	7,364	sw.	72	sw.	7	17	4	9	3.9	
Harrisburg	377	94	104	...	...	...	68.4	+ 4.0	94	3	78	46	21	58	28	...	...	...	2.08	− 2.0	9	4,007	sw.	30	nw.	18	12	12	6	4.2	
Philadelphia	117	168	184	29.97	30.09	− .01	71.4	+ 4.3	96	1	80	51	11	63	22	63	59	73	1.82	− 1.5	7	6,178	sw.	32	nw.	27	18	5	7	3.4	
Atlantic City	52	68	76	30.04	30.08	.00	68.0	+ 1.3	89	3	74	50	21	62	21	64	62	84	1.81	− 1.7	8	6,838	sw.	28	n.	27	19	4	7	3.5	
Cape May	24	52	70	30.07	30.09	...	67.8	− 0.3	83	3	71	55	21	64	15	...	...	...	3.25	− 0.7	7	7,342	s.	40	s.	23	18	6	6	3.0	
Baltimore	123	68	82	29.96	30.09	− .01	71.4	+ 3.5	97	3	81	52	11	62	29	63	59	68	1.56	− 2.3	4	3,425	sw.	19	w.	7	20	4	6	3.3	
Washington	112	59	76	29.98	30.10	− .01	71.0	+ 3.2	95	3	81	48	12	61	28	63	60	76	0.89	− 2.8	5	3,608	s.	30	nw.	24	18	9	3	3.5	
Cape Henry	...	5	34	...	...	...	74.4	+ 2.6	95	6	81	59	29	68	21	...	...	...	3.20	− 1.4	8	...	s.	...	...	...	15	12	3	...	
Lynchburg	685	83	88	29.39	30.12	+ .03	71.2	+ 2.2	93	6	82	46	12	60	32	64	61	77	4.50	+ 0.7	6	2,203	ne.	21	nw.	24	17	9	4	3.8	
Norfolk	57	88	93	30.04	30.10	+ .01	73.8	+ 2.7	92	6	81	60	29	67	25	68	65	79	3.34	− 1.2	7	5,525	ne.	27	sw.	4	18	6	6	4.0	
Richmond	144	98	105	...	...	...	73.1	...	94	18	83	50	12	63	29	...	...	...	2.33	...	6	4,116	n.	24	w.	5	14	9	7	4.6	
S. Atlantic States.							76.2	+ 2.2										82	3.13	− 2.2										4.8	
Charlotte	773	68	76	29.28	30.09	.00	73.2	+ 2.1	90	19	82	53	13	64	24	66	63	78	4.04	+ 0.7	9	4,072	ne.	24	n.	5	11	12	7	4.8	
Hatteras	11	17	36	30.08	30.09	+ .02	76.2	+ 2.5	86	1	80	67	12	72	12	71	69	82	1.59	− 4.8	5	9,655	n.	36	n.	10	18	9	3	3.2	
Kittyhawk	9	12	30	...	...	...	74.7	+ 1.3	91	7	80	64	10	70	19	...	...	...	4.45	− 0.2	6	11,125	...	...	...	...	16	7	7	4.4	
Raleigh	375	93	101	29.72	30.11	.00	73.4	+ 2.9	90	6	82	51	12	65	26	66	64	78	3.95	+ 0.2	7	4,341	ne.	25	sw.	3	13	10	7	4.4	
Wilmington	78	82	90	30.01	30.10	+ .03	75.7	+ 2.1	91	19	83	56	12	68	23	70	68	85	1.28	− 5.1	7	5,959	ne.	26	ne.	21	9	16	5	4.9	
Charleston	48	14	92	30.05	30.10	+ .04	78.3	+ 2.3	89	6	84	64	12	73	17	72	70	82	1.49	− 5.1	8	8,267	ne.	38	e.	21	4	24	2	5.1	
Columbia	...	5	...	...	...	...	76.1	+ 2.3	95	4	86	55	13	66	31	...	...	...	3.04	− 1.1	9	...	sw.	...	...	...	10	9	11	...	
Augusta	180	89	103	29.89	30.08	+ .03	76.4	+ 2.0	92	6	85	57	13	68	27	69	67	79	2.92	− 1.0	8	3,852	ne.	28	se.	21	11	10	9	5.2	
Savannah	82	63	80	29.99	30.07	+ .01	78.0	+ 2.2	91	4	85	64	12	71	20	72	71	87	5.06	− 1.1	10	5,639	ne.	25	s.	1	10	14	6	5.4	
Jacksonville	43	69	84	29.99	30.04	+ .01	79.8	+ 2.2	93	3	86	69	15	73	20	74	73	86	3.46	− 5.0	13	5,472	ne.	28	se.	8	4	23	3	5.7	
Florida Peninsula.							81.3	+ 0.7										81	5.09	− 2.7										4.3	
Jupiter	28	13	30	29.96	29.99	− .02	81.3	+ 1.7	91	17	86	72	9	76	15	76	74	80	3.38	− 6.3	24	7,886	se.	28	se.	22	16	14	0	3.8	
Key West	22	43	50	29.96	29.98	− .01	82.0	− 0.5	89	29	87	69	2	77	17	76	73	77	5.33	− 2.1	16	5,322	e.	20	se.	2	5	20	5	5.4	
Tampa	36	60	67	29.97	30.01	− .01	80.5	+ 0.9	93	19	89	69	2	72	21	74	72	85	6.57	+ 0.4	15	4,128	ne.	36	s.	2	16	9	5	3.7	
East Gulf States.							77.7	+ 1.3										82	11.87	+ 7.4										5.8	
Atlanta	1,131	92	126	28.92	30.09	− .01	73.8	+ 2.3	89	27	81	59	13	66	23	67	65	81	6.33	+ 2.4	12	5,368	ne.	36	s.	1	9	3	18	6.5	
Pensacola	56	78	90	29.95	30.01	− .02	79.0	+ 1.5	90	18	84	69	27	74	18	74	72	83	17.93	+13.1	13	6,898	ne.	39	se.	30	7	13	10	6.1	
Mobile	57	88	96	29.96	30.02	− .01	78.0	+ 1.2	90	1	84	66	29	72	21	72	71	85	16.40	+11.2	13	4,688	n.	26	s.	21	13	6	11	4.7	
Montgomery	221	100	112	29.80	30.03	− .02	76.8	+ 1.2	92	2	85	60	8	68	26	70	68	79	1.13	− 1.8	10	4,068	ne.	21	ne.	7	12	6	12	5.4	
Vicksburg	247	65	73	29.72	29.98	− .07	77.1	+ 1.8	92	2	85	55	8	69	24	71	69	83	8.93	+ 5.4	8	4,827	e.	36	se.	12	11	9	10	5.5	
New Orleans	54	112	120	29.93	29.99	− .02	79.5	+ 1.2	92	2	85	68	8	74	17	74	72	84	13.90	+ 9.3	18	5,929	se.	42	se.	20	9	9	12	5.4	
Port Eads	...	27	...	...	...	...	79.6	− 0.2	87	*	84	71	28	75	12	...	...	...	18.44	+12.4	17	...	e.	...	...	...	3	11	16	6.9	
West Gulf States.							78.1	+ 2.1										79	4.71	+ 0.7										4.3	
Shreveport	249	77	84	29.70	29.96	− .08	77.0	+ 1.5	93	2	86	56	8	68	26	70	68	80	5.42	+ 1.7	9	4,121	se.	26	ne.	20	16	5	9	4.4	
Fort Smith	481	63	72	29.46	29.96	− .06	76.2	+ 3.9	96	3	86	52	8	66	28	68	65	79	5.00	+ 1.5	7	3,210	e.	16	n.	6	12	11	7	4.8	
Little Rock	302	71	79	29.68	30.00	− .06	75.7	+ 2.8	96	3	84	56	8	67	27	69	67	81	10.23	+ 7.1	10	4,564	s.	32	n.	15	15	7	8	4.9	
Corpus Christi	20	42	50	29.91	29.93	− .08	80.4	+ 1.6	94	30	86	69	12	75	22	75	73	81	2.33	− 2.4	9	8,147	se.	34	ne.	18	16	10	4	3.4	
Fort Worth	670	106	114	...	...	...	77.2	...	98	15	89	55	*	65	37	...	...	...	0.29	...	4	...	s.	...	...	...	19	9	2	3.2	
Galveston	54	85	96	29.87	29.92	− .08	80.3	+ 0.8	89	6	85	68	17	76	19	74	72	80	6.78	+ 0.6	11	5,752	se.	26	ne.	19	10	11	9	5.2	
Palestine	510	54	61	29.42	29.95	− .10	77.8	+ 2.1	95	6	88	55	18	68	33	71	69	84	1.92	− 1.3	7	4,187	ne.	18	sw.	1	14	7	9	5.0	
San Antonio	704	95	104	29.21	29.93	− .08	79.6	+ 2.1	95	30	90	62	13	70	30	69	64	67	1.32	− 2.1	5	5,650	se.	30	e.	17	20	7	3	3.2	
Ohio Val. & Tenn.							72.4	+ 3.9										77	3.83	+ 0.9										4.3	
Chattanooga	762	106	112	29.31	30.10	+ .01	73.6	+ 2.9	90	5	82	57	8	65	27	67	65	83	6.50	+ 2.6	6	3,723	ne.	27	sw.	3	9	13	8	5.2	
Knoxville	1,004	10	88	29.05	30.09	− .01	72.7	+ 3.4	89	4	83	51	8	62	28	66	64	84	7.44	+ 4.7	9	3,831	n.	30	nw.	7	12	9	9	4.7	
Memphis	399	140	154	29.61	30.02	− .05	76.2	+ 4.1	93	2	84	57	8	68	22	69	67	78	5.57	+ 2.4	9	6,768	sw.	34	e.	21	13	7	10	4.8	
Nashville	545	128	134	29.48	30.05	− .01	75.2	+ 4.5	93	4	85	51	8	65	28	66	63	73	4.87	+ 0.8	8	4,105	s.	26	nw.	15	19	7	4	3.5	
Lexington	989	75	104	29.03	30.06	.00	72.0	+ 3.9	92	1	82	49	12	62	30	65	63	82	3.55	+ 1.0	15	6,070	s.	38	s.	4	9	13	8	5.3	
Louisville	525	114	136	29.50	30.06	− .02	73.8	+ 4.4	97	2	84	52	11	64	32	65	62	75	2.97	+ 0.2	9	4,887	sw.	48	w.	15	14	7	9	4.7	
Evansville	434	72	82	...	...	...	73.9	...	95	2	83	52	8	65	27	...	...	...	3.26	...	10	4,383	s.	31	s.	29	17	6	7	3.5	
Indianapolis	823	154	164	29.19	30.04	− .03	70.2	+ 4.2	93	3	80	47	11	61	29	62	59	74	4.23	+ 1.3	10	6,760	s.	27	s.	22	13	4	13	5.1	
Cincinnati	628	152	157	29.41	30.07	.00	72.3	+ 4.2	94	3	82	49	11	63	26	63	59	70	2.62	+ 0.2	9	4,753	se.	30	ne.	24	21	6	3	3.2	
Columbus	824	87	100	29.19	30.05	− .01	69.8	+ 3.7	95	3	81	44	12	59	32	63	60	80	1.77	− 0.8	9	4,802	sw.	23	w.	23	16	10	4	3.6	
Pittsburg	842	116	123	29.18	30.07	− .01	70.2	+ 3.5	94	1	79	48	12	61	34	62	58	71	1.06	− 1.5	8	3,799	sw.	24	n.	4	14	12	4	4.5	
Parkersburg	638	77	84	29.42	30.09	− .03	70.6	+ 3.8	96	1	82	45	12	50	36	62	59	76	2.09	− 1.1	7	3,289	se.	41	nw.	4	15	10	5	3.6	
Lower Lake Region.							66.8	+ 3.7										73	2.89	0.0										4.4	
Buffalo	768	178	206	29.22	30.03	− .02	66.6	+ 4.5	83	3	74	46	21	60	26	60	56	73	3.04	− 0.3	10	9,826	sw.	47	w.	18	13	10	7	4.7	
Oswego	335	76	87	29.65	30.01	− .05	64.6	+ 2.9	89	2	73	41	21	56	28	59	55	75	4.40	+ 1.6	10	6,973	se.	34	n.	24	15	8	7	3.9	
Rochester	523	81	90	29.46	30.02	− .03	66.0	+ 4.0	94	2	76	41	11	56	31	59	55	77	3.36	+ 1.0	9	5,079	sw.	26	sw.	4	15	8	7	4.2	
Erie	714	92	102	29.30	30.05	− .01	67.0	+ 3.4	88	2	74	46	11	60	27	61	58	76	2.62	− 1.3	7	7,461	s.	30	s.	22	12	14	4	4.5	
Cleveland	762	190	201	29.24	30.04	− .03	67.0	+ 3.2	92	3	75	46	11	59	29	60	55	69	2.53	− 0.9	11	9,648	se.	48	s.	24	9	18	3	4.8	
Sandusky	629	62	74	29.38	30.04	− .02	68.2	+ 3.1	95	3	77	48	12	60	30	61	57	72	2.09	− 0.7	10	5,169	sw.	30	ne.	9	9	12	9	5.2	
Toledo	674	122	127	29.33	30.03	− .02	67.6	+ 3.7	94	3	77	45	11	58	28	60	56	73	1.81	− 0.6	9	6,367	sw.	60	s.	24	14	9	7	3.8	
Detroit	730	160	166	29.26	30.04	− .02	67.4	+ 4.5	95	3	76	47	11	59	25	59	55	71	3.30	+ 0.8	9	6,518	sw.	30	w.	26	13	12	5	4.1	
Upper Lake Region.							63.1	+ 3.8										77	2.62	− 0.8										4.7	
Alpena	609	61	65	29.33	29.98	− .03	61.4	+ 4.2	91	3	70	37	10	52	31	56	54	82	2.91	− 0.9	13	6,140	w.	39	se.	24	15	10	5	4.2	
Grand Haven	628	55	64	29.33	30.00	− .03	64.2	+ 3.3	85	1	72	38	11	56	32	58	55	77	4.06	+ 0.5	10	5,873	nw.	33	nw.	6	13	12	5	4.2	
Marquette	734	67	95	29.13	29.90	− .09	61.7	+ 4.9	94	2	70	38	10	53	27	55	52	78	1.47	− 2.4	15	7,381	sw.	38	sw.	28	8	11	11	5.6	
Port Huron	639	70	108	29.35	30.03	− .01	66.1	+ 4.9	95	2	76	39	11	56	32	58	56	78	2.34	− 0.3	14	7,061	s.	35	sw.	24	15	8	7	4.4	
Sault Ste. Marie	624	58	65	29.28	29.94	− .07	58.2	+ 2.7	88	3	67	37	10	50	27	54	52	83	3.42	− 1.0	14	5,900	nw.	36	nw.	19	8	14	8	5.4	
Chicago	824	241	274	29.15	30.01	− .03	67.6	+ 3.4	92	3	74	49	7	61	20	60	56	71	3.16	+ 0.3	11	11,479	ne.	41	e.	22	16	8	6	4.2	
Milwaukee	671	106	149	29.30	30.00	− .04	65.4	+ 4.2	94	2	73	44	11	58	26	58	55	74	1.98	− 0.9	8	6,063	se	45	se.	6	9	13	8	4.6	
Green Bay	617	49	57	29.32	29.98	− .06	63.7	+ 3.2	94	2	73	40	11	54	31	56	52	74	3.07	0.0	7	5,081	w.	32	s.	24	18	9	8	4.5	
Duluth	702	95	106	29.16	29.91	− .07	59.2	+ 3.0	86	2	68	40	10	50	31	52	48	74	1.21	− 2.6	10	7,189	sw.	34	sw.	3	10	11	9	5.1	
North Dakota.							57.9	+ 1.6										64	1.10	− 0.2										4.1	
Moorhead	935	54	60	28.90	29.90	− .06	58.8	+ 2.3	94	1	72	30	9	46	40	50	44	68	1.56	− 0.5	8	7,153	nw.	38	nw.	3	11	11	8	4.8	
Bismarck	1,674	16	29	28.18	29.94	− .01	58.6	+ 1.6	97	20	72	28	9	45	47	48	41	60	0.76	− 0.4	5	6,541	nw.	50	nw.	3	18	6	6	3.8	
Williston	1,872	15	31	27.94	29.92	− .03	56.4	+ 0.9	95	27	70	26	9	42	53	47	39	63	0.99	+ 0.2	4	6,635	sw.	50	nw.	28	21	5	4	3.7	
Upper Miss. Valley.							68.5	+ 3.5										75	4.05	+ 0.9										4.3	
Minneapolis	...	90	...	...	...	...	64.1	+ 1.9	96	2	75	39	9	53	40	...	...	...	0.83	− 1.7	6	...	nw.	...	...	...	11	11	8	...	
St. Paul	837	114	124	29.05	29.94	− .05	63.4	+ 3.6	95	2	75	38	9	52	39	53	47	64	0.90	− 2.1	6	4,887	se.	32	se.	23	14	9	7	4.3	
La Crosse	720	70	78	...	...	...	64.3	+ 2.7	95	2	76	35	11	52	34	...	...	...	1.64	− 2.6	7	4,299	s.	36	se.	29	13	10	7	4.8	
Davenport	599	71	79	29.34	29.97	− .07	68.1	+ 3.4	91	2	77	46	11	59	29	60	57	76	3.14	0.0	7	4,804	sw.	28	nw.	4	14	10	6	4.4	

TABLE I.—*Climatological data for Weather Bureau Stations, September, 1898*—Continued.

Stations.	Elevation of instruments			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometers above ground.	Mean actual, 8 a. m. and 8 p. m. ÷ 2.	Mean reduced.	Departure from normal.	Mean max. and min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
Up. Miss. Val.—Con.																															
Des Moines	867	84	88	29.07	29.99	− .02	67.4	+ 3.3	94	2	78	45	7	56	37	59	55	71	1.91	− 1.3	9	4,721	sw.	35	sw.	29	17	8	5	4.1	
Dubuque	698	101	109	29.25	29.99	− .04	65.8	+ 2.6	91	2	76	40	11	56	29	57	53	71	3.07	− 1.0	9	4,317	s.	28	se.	22	17	10	3	3.6	
Keokuk	614	64	78	29.34	29.99	− .04	70.8	+ 4.4	94	2	79	49	7	62	26	63	60	76	8.07	+ 4.6	10	4,781	sw.	24	se.	13	10	13	7	4.3	
Cairo	359	87	93	29.64	30.01	− .04	74.2	+ 4.3	93	2	83	55	7	66	23	68	66	84	6.11	+ 3.6	10	4,898	s.	36	s.	29	9	14	7	4.9	
Springfield, Ill	644	82	92	29.33	30.00	− .06	70.0	+ 3.6	92	2	80	47	11	60	29	63	60	78	6.82	+ 3.6	11	5,825	sw.	27	e.	21	12	8	10	4.8	
Hannibal	534	75	107	......	......	......	71.1	+ 4.4	95	3	80	48	7	62	29	....	....	....	8.86	+ 6.4	12	6,323	sw.	38	n.	4	16	8	6	3.7	
St. Louis	567	111	210	29.42	30.02	− .03	74.2	+ 4.8	95	2	83	51	11	65	25	67	64	77	3.23	+ 0.1	12	6,627	s.	30	sw.	5	14	9	7	4.2	
Missouri Valley.							68.0	+ 2.5										65	3.07	+ 0.5										3.9	
Columbia	......	4	84	......	......	......	72.2	+ 3.7	98	3	83	43	8	61	39	....	....	....	5.43	+ 1.8	11	5,133	s.	44	n.	5	10	12	8	4.9	
Kansas City	963	78	95	28.98	29.98	− .04	71.4	+ 3.9	94	4	81	48	10	62	28	64	60	74	4.48	+ 1.0	10	5,827	se.	31	se.	4	15	9	6	3.6	
Springfield, Mo	1,324	100	103	28.61	29.98	− .05	70.8	+ 3.1	88	4	79	49	7	63	23	65	63	81	6.78	+ 2.7	11	6,633	se.	35	nw.	15	10	15	5	4.3	
Topeka	......	81	....	......	......	......	71.3	+ 2.6	97	3	82	46	7	60	32	....	....	....	4.98	+ 2.1	8	......	s.	....	......	...	13	14	3	....	
Lincoln	1,199	74	84	28.69	29.95	− .06	68.2	+ 2.1	97	2	80	43	9	56	37	57	51	65	2.32	+ 0.4	5	7,007	s.	36	n.	5	20	5	5	3.5	
Omaha	1,103	92	97	28.80	29.95	− .06	68.3	+ 3.5	96	2	79	43	9	58	31	58	53	65	2.94	0.0	6	5,361	se.	30	s.	29	21	3	6	3.0	
Sioux City	1,139	96	164	......	......	......	65.2	0.0	96	2	78	41	30	52	40	....	....	....	0.95	− 0.2	3	7,864	s.	50	s.	29	18	2	10	3.7	
Pierre	1,460	50	62	28.40	29.93	− .06	64.6	+ 0.9	100	1	78	34	10	51	46	50	39	47	0.26	− 0.7	2	6,002	se.	37	s.	30	18	5	7	3.8	
Huron	1,306	56	67	28.56	29.94	− .06	62.2	+ 2.1	100	2	78	29	30	47	47	50	42	60	1.31	− 0.1	7	8,290	se.	44	s.	27	17	10	3	3.8	
Yankton	1,234	52	58	......	......	......	65.5	+ 3.4	96	2	78	35	30	53	39	....	....	....	1.25	− 1.6	3	5,933	e.	43	s.	29	16	8	6	4.3	
Northern Slope.							58.6	+ 0.5										51	1.07	+ 0.1										3.7	
Havre	2,494	46	47	27.28	29.86	− .10	57.7	+ 2.8	90	19	72	32	12	43	49	47	38	57	1.06	− 0.1	8	6,724	w.	42	nw.	23	15	11	4	4.1	
Miles City	2,372	41	49	27.44	29.89	− .09	59.6	− 0.4	91	27	73	34	10	46	45	50	43	63	0.89	+ 0.2	4	4,194	w.	33	sw.	2	12	14	4	4.1	
Helena	4,108	88	93	25.85	29.99	.00	56.7	+ 0.9	87	19	68	32	30	45	40	45	33	47	0.87	− 0.3	8	5,423	sw.	32	sw.	2	15	6	9	4.3	
Rapid City	3,251	46	50	26.61	29.92	− .05	61.2	− 0.2	99	20	75	34	10	48	47	47	34	46	1.27	+ 0.7	3	5,601	w.	48	w.	2	14	11	5	4.1	
Cheyenne	6,105	58	60	24.06	29.96	− .01	57.0	+ 0.8	86	20	73	28	6	41	43	41	20	34	0.47	− 0.4	5	6,940	nw.	43	nw.	29	18	8	4	3.3	
Lander	5,372	28	36	24.68	29.99	+ .01	55.4	− 0.3	86	19	73	26	11	38	50	42	28	44	0.36	− 0.4	5	3,416	sw.	36	sw.	27	17	11	2	3.1	
North Platte	2,826	43	52	27.07	29.98	− .02	62.3	− 0.1	98	2	77	35	7	48	44	52	46	67	2.56	+ 1.3	6	5,969	s.	40	n.	5	22	3	5	3.0	
Middle Slope.							68.0	+ 0.6										60	1.77	0.0										3.2	
Denver	5,290	79	151	24.77	29.97	+ .01	61.9	0.0	90	2	79	32	11	45	45	45	27	39	0.28	− 0.5	6	5,563	s.	41	s.	30	17	10	3	3.4	
Pueblo	4,713	74	81	25.33	29.97	+ .02	61.8	− 3.4	94	2	79	33	10	44	48	46	31	44	0.51	+ 0.1	4	4,795	e.	38	ne.	5	18	10	2	3.2	
Concordia	1,398	42	47	28.47	29.93	− .07	70.0	+ 2.2	100	4	83	41	7	57	42	58	53	67	3.40	+ 1.0	6	5,104	s.	32	s.	29	17	8	5	3.9	
Dodge	2,504	44	52	27.38	29.93	− .04	68.2	+ 0.6	97	5	82	36	7	55	41	56	50	67	3.16	+ 1.8	5	7,432	s.	55	nw.	16	19	6	5	3.6	
Wichita	1,351	78	85	28.54	29.94	− .05	72.0	+ 2.0	98	27	85	44	7	59	35	61	57	70	1.55	− 1.1	6	5,292	s.	36	w.	16	20	7	3	3.0	
Oklahoma	1,218	54	62	28.69	29.95	− .05	74.1	+ 2.5	97	26	86	45	12	63	35	63	59	70	1.72	− 1.2	4	6,474	s.	30	s.	1	25	1	4	2.2	
Southern Slope.							71.2	+ 0.2										58	1.96	− 0.3										3.2	
Abilene	1,749	45	54	28.18	29.97	− .04	75.4	+ 0.8	100	15	87	46	12	64	33	62	56	61	3.44	+ 1.0	6	6,360	s.	31	se.	1	18	6	6	3.5	
Amarillo	3,691	54	61	26.28	29.98	− .02	67.0	− 0.4	95	4	80	37	11	53	40	54	45	55	0.48	− 1.6	5	10,945	s.	48	s.	5	19	6	5	2.8	
Southern Plateau.							72.6	+ 1.7										32	0.23	− 0.6										1.4	
El Paso	3,767	10	110	26.18	29.92	− .01	73.2	+ 0.1	93	21	87	46	12	60	41	56	43	44	0.50	− 0.6	6	7,151	e.	45	ne.	16	19	9	2	2.3	
Santa Fe	6,998	47	50	23.34	29.95	− .04	61.1	+ 1.2	82	25	74	32	12	48	35	45	24	33	0.18	− 1.3	2	3,910	se.	30	s.	1	23	5	2	2.1	
Phenix	1,076	47	57	28.69	29.78	− .07	84.2	+ 3.4	106	18	99	64	26	69	38	62	46	32	0.04	− 0.5	1	3,219	e.	27	se.	10	29	1	0	0.4	
Yuma †	139	16	50	29.59	29.73	− .08	86.7	+ 2.3	110	18	102	63	29	71	42	67	56	44	0.00	0.0	0	2,739	ne.	20	se.	30	29	1	0	0.3	
Independence	3,907	10	58	25.98	29.78	− .09	72.0	+ 2.0	94	*	86	48	27	58	34	50	18	18	0.20	+ 0.1	2	5,335	nw.	52	nw.	30	28	1	1	0.9	
Middle Plateau.							63.0	+ 1.8										31	0.17	− 0.4										2.6	
Carson City	4,720	82	92	25.24	29.90	− .03	62.4	+ 3.1	91	18	79	34	2	46	47	47	28	33	0.12	− 0.2	1	4,748	sw.	48	sw.	30	22	5	3	2.2	
Winnemucca	4,340	59	70	25.64	29.93	− .02	61.0	+ 0.9	93	18	78	26	29	44	48	46	25	33	0.25	− 0.1	3	6,345	nw.	36	n.	30	19	6	5	3.2	
Salt Lake City	4,344	83	90	25.63	29.93	− .03	65.6	+ 1.3	90	19	80	36	29	52	37	49	30	28	0.15	− 0.8	2	4,432	se.	33	s.	30	21	7	2	2.5	
Northern Plateau.							60.2	+ 1.4										52	0.88	− 0.4										3.0	
Baker City	3,470	49	55	26.41	29.95	− .03	58.5	+ 2.7	92	18	74	30	28	43	46	45	30	44	0.47	− 0.3	5	4,187	s.	23	nw.	1	19	3	8	3.3	
Idaho Falls	4,742	10	56	25.24	29.97	− .02	56.6	− 0.9	91	19	75	29	29	38	50	45	32	50	0.03	− 0.6	1	7,807	s.	40	s.	2	24	1	5	1.9	
Spokane	1,943	99	107	27.91	29.93	− .05	60.4	+ 2.3	88	18	74	37	28	47	42	50	40	53	0.47	− 0.5	5	4,357	ne.	28	sw.	27	15	6	9	3.8	
Walla Walla	1,018	65	73	28.86	29.93	− .07	65.4	+ 1.5	92	17	78	43	28	53	37	57	50	60	0.56	− 0.4	6	3,772	s.	25	sw.	27	19	11	0	3.1	
N. Pac. Coast Reg.							58.7	+ 1.7										76	3.59	+ 0.4										5.2	
Fort Canby	179	10	34	29.75	29.94	− .07	58.0	+ 1.0	85	6	63	46	30	53	28	55	53	87	4.83	+ 1.1	15	8,626	n.	60	se.	21	9	5	16	6.1	
Neah	40	....	....	29.88	29.93	− .07	55.1	− 0.1	77	6	61	42	30	50	25	52	50	86	4.87	− 2.4	11	4,083	w.	27	w.	27	7	1	22	7.2	
Port Angeles	29	47	62	......	......	......	55.0	+ 2.2	76	7	62	38	30	48	29	....	....	....	1.78	− 0.1	9	3,532	nw.	30	nw.	27	13	13	4	3.9	
Pysht f	....	5	....	......	......	......	55.0	+ 1.9	76	6	62	41	30	48	27	...	....	....	4.21	− 0.5	9	......	w.	....	......	...	13	3	8	....	
Seattle	119	114	121	29.82	29.95	− .08	60.8	+ 3.6	87	6	69	46	30	52	34	55	51	74	2.92	+ 0.6	10	3,668	se.	21	se.	28	11	8	11	5.1	
Tacoma	213	113	120	......	......	......	59.6	+ 3.4	84	7	68	43	30	51	34	...	....	....	4.24	+ 2.1	11	3,805	n.	25	sw.	21	13	6	11	5.0	
Astoria	......	18	....	......	......	......	60.0	+ 0.8	84	6	67	46	30	53	30	....	....	....	5.18	+ 0.9	10	......	sw.	...	......	...	11	5	14	....	
Portland, Oreg	153	208	213	29.78	29.94	− .09	62.8	+ 2.1	88	7	72	44	30	54	29	55	49	67	2.69	+ 0.9	8	6,102	nw.	34	ne.	6	11	11	8	4.4	
Roseburg	521	56	67	29.38	29.94	− .10	61.7	+ 0.8	95	6	74	43	12	50	45	54	49	68	1.63	+ 0.6	6	2,595	nw.	18	sw.	28	12	11	7	4.4	
Mid. Pac. C'st Reg.							62.2	− 0.9										66	0.83	+ 0.1										3.8	
Eureka	64	60	69	29.93	29.99	− .01	56.0	+ 0.6	70	19	60	47	17	52	14	54	52	86	1.48	+ 0.2	6	3,480	nw.	30	nw.	27	6	10	14	6.4	
Red Bluff	334	54	58	29.52	29.87	− .04	72.6	− 1.2	102	6	86	53	30	59	42	56	42	39	0.45	− 0.2	4	3,874	se.	26	se.	24	21	7	2	2.2	
Sacramento	71	106	117	29.80	29.87	− .07	68.8	− 0.7	98	12	84	45	9	54	41	57	47	54	0.36	0.0	1	5,789	sw.	24	sw.	1	24	2	4	2.2	
San Francisco	153	161	167	29.78	29.94	− .01	59.0	− 1.4	80	11	65	50	16	53	24	55	53	84	1.06	+ 0.8	3	8,586	w.	35	w.	8	10	15	5	4.5	
Point Reyes Light	......	12	....	......	......	......	54.6	− 2.0	68	19	58	48	6	51	15	....	....	....	0.80	− 0.2	5	......	nw.	...	.....	...	11	7	12	....	
S. Pac. Coast Reg.							69.3	+ 0.9										64	0.35	+ 0.2										2.0	
Fresno	332	67	70	29.49	29.84	− .04	72.8	− 1.7	105	12	89	50	29	57	42	57	42	41	1.12	+ 0.9	1	3,300	nw.	18	nw.	30	26	0	4	1.4	
Los Angeles	330	74	82	29.51	29.86	− .05	71.0	+ 2.5	99	8	84	48	14	58	42	60	55	68	0.02	− 0.1	2	2,725	w.	17	w.	16	19	10	1	2.4	
San Diego	87	94	102	29.76	29.86	− .06	68.5	+ 1.5	91	11	74	56	2	63	25	63	60	77	0.07	0.0	2	3,904	nw.	22	nw.	11	26	2	2	1.9	
San Luis Obispo	201	10	46	29.71	29.92	− .02	64.8	+ 1.4	100	11	79	41	24	50	50	55	50	70	0.20	+ 0.1	1	3,325	w.	19	s.	25	23	5	2	2.5	
West Indies.																															
Basseterre	29	41	55	29.88	29.91	....	80.8	....	89	11	86	70	20	75	17	76	74	84	12.37	....	19	6,876	e.	54	s.	12	14	9	7	4.6	
Bridgetown	30	57	65	29.93	29.96	....	79.5	....	88	2	85	69	21	74	14	75	74	88	19.72	....	21	4,753	ne.	62	ne.	10	5	9	16	6.7	
Colon	.....	....	....	29.79	29.82	....	......	....	....	...	....	.....	...	.....	....	74	73	87	....	....	....	....	s.	....	......	...	5	17	8	6.0	
Kingston	......	....	....	......	......	......	......	......	....	...	....	.....	...	.....	....	....	....	....	....	......	....	....	......	....	......	...	...	...	...	....	
Nassau	......	....	....	......	......	......	......	......	....	...	....	.....	...	.....	....	....	....	....	....	......	....	....	......	....	......	...	...	...	...	....	
Port of Spain	......	....	....	......	......	......	......	......	....	...	....	.....	...	.....	....	....	....	....	....	......	....	....	......	....	......	...	...	...	...	....	
St. Pierre	....	....	....	......	......	......	......	......	....	...	....	.....	...	.....	....	....	....	....	....	......	....	....	......	....	......	...	...	...	...	....	
Santiago de Cuba	......	....	....	......	......	......	......	......	....	...	....	.....	...	.....	....	....	....	....	....	......	....	....	......	....	......	...	...	...	...	....	
Santo Domingo	59	82	88	29.90	29.96	......	78.7	.....	90	12	86	69	10	71	20	73	72	88	6.01	....	17	2,554	nw.	15	s.	24	2	18	10	5.8	
Willemstad	75	39	46	29.83	29.90	....	82.4	....	89	27	87	70	19	77	13	76	74	81	2.55	....	18	6,448	e.	28	s.	12	9	12	9	5.4	

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. * Two or more dates. † Received too late to be considered in departures, etc.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, September, 1898.*

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Alabama.					
Alco †	92	59	75.3	7.02	
Ashville †	92	54	71.6	3.79	
Bermuda †	88	63	75.1	6.09	
Birmingham †	97	57	77.3	1.05	
Bridgeport †	......	......	......	7.83	
Citronelle †	89	63	76.8	8.29	
Clanton †	88	56	74.1	0.66	
Daphne	93	64	78.8	14.86	
Decatur †	96	50	74.1	3.55	
Demopolis	......	......	......	2.56	
Elba	92	59	75.0	2.11	
Eufaula *a* †	93	59	77.0	1.63	
Evergreen	100	59	77.6	6.11	
Florence *a* †	......	......	......	1.82	
Florence *b* †	93	50	76.0	2.05	
Fort Deposit	92	61	77.2	1.17	
Gadsden	90	52	72.0	3.19	
Goodwater	96	58	76.5	1.37	
Greensboro †	91	58	76.1	2.63	
Hamilton	98	54	76.0	3.97	
Highland Home †	89	64	76.3	2.40	
Jasper	......	......	......	2.49	
Livingston	93	56	76.8	2.99	
Lock No. 4	91	58	74.2	2.44	
Madison Station †	92	48	73.0	1.88	
Maplegrove	91	53	73.8	4.76	
Marion †	95	58	77.2	1.90	
Mount Willing †	91	60	75.8	1.46	
Newbern †	92	59	77.0	2.84	
Newton †	91	57	74.2	1.89	
Oneonta	89	50	72.3	1.31	
Opelika †	92	58	75.3	3.43	
Oxanna †	90	51	72.9	1.85	
Pineapple	97	60	77.4	2.50	
Pushmataha †	93	63	76.4	4.64	
Riverton †	98	48	76.3	......	
Rockmills	94	58	74.6	0.71	
Scottsboro †	90	53	73.9	4.19	
Selma †	95	62	77.6	1.28	
Sturdevant	......	......	......	0.46	
Talladega	93	54	74.4	0.63	
Tallassee	......	......	......	1.35[d]	
Thomasville	91	50	74.2	2.88	
Tuscaloosa †	95	53	76.8	2.14	
Tuscumbia	94	54	76.6	3.75	
Union †	......	62	......	3.51	
Union Springs †	90	61	76.4	1.55	
Uniontown †	94	62	78.4	3.19	
Valleyhead	93	52	72.6	6.80	
Warrior	......	......	......	1.29	
Wetumpka	91	59	76.6	1.93	
Wilsonville †	......	......	......	1.83	
Arizona.					
Benson *[1]	91	62	76.0	2.07	
Bisbee †	87	54	70.7	2.11	
Buckeye †	108	56	82.2	0.00	
Calabasas	90	44	71.6	0.04	
Camp Creek	97	62	79.3	0.10	
Casa Grande *[1]	101	69	83.9	1.00	
Champie Camp	108	59	83.4	0.00	
Congress	99	66	82.4	T.	
Dragoon Summit *[1]	91	65	75.3	1.51	
Dudleyville	99	54	77.5	0.22	
Empire Ranch	86[1]	52[1]	71.0[1]	0.36[1]	
Fort Apache	89	35	65.3	0.12	
Fort Defiance	82	29	59.7	0.10	
Fort Grant †	90	53	72.5	0.67	
Fort Huachuca †	91	54	72.0	0.68	
Fort Mohave	114	60[1]	88.6[d]	0.00	
Gilabend *a* *[1]	112	66	84.8	0.00	
Holbrook †	95	35	67.5	0.08	
Hot Springs	101	60	82.2	T.	
Jerome	93	55	75.3	0.00	
Lochiel *[1]	83	54	69.3	0.68	
Maricopa *[1]	113	68	84.7	0.00	
Mesa †	103	59	82.2	T.	
Mount Huachuca	87	51	70.0	0.45	
Music Mountain	104	51	79.5	0.00	
Natural Bridge	......	......	......	0.70	
Oracle	92	56	73.0	0.25	
Oro	......	......	......	1.79	
Oro Blanco	92	60	76.2	0.58	
Pantano *[1]	89	67	75.8	0.42	
Parker	118	55	88.7	0.00	
Phenix	100	55	79.6	0.00	
Pima	99	48	76.0	0.30	
Pinal Ranch	......	......	......	0.00	
Prescott	88	......	......	0.00	
San Carlos †	103	51	79.0	0.00	
San Simon *[1]	95	57	72.8	1.01	
Signal †	105	55	81.4	0.00	
Snowflake	86	32	64.0	0.10	
Strawberry	88	33	62.4	0.08	
Sulphur Spring Valley	......	......	......	0.84	
Texas Hill *[1]	114	69	89.0	0.00	
Tombstone	90	57	73.2	0.85	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
***Arizona*—Cont'd.**					
Tucson †	102	54	79.3	0.10	
Walnut Grove	......	......	......	0.00	
White Hills	101	65	86.8	0.00	
Willcox *[1]	84	58	67.0	0.20	
Yarnell	......	......	......	0.15	
Arkansas.					
Amity	94	40	74.5	3.26	
Arkansas City †	......	......	......	4.97	
Beebranch	......	......	......	7.99	
Blanchard Springs †	95	47	75.2	4.71	
Brinkley	97	49	76.0	7.00	
Camden *a* †	......	......	......	5.34	
Camden *b* †	97	52	75.9	5.55	
Canton *[1]	98	49	74.8	....	
Conway	104	44	78.1	8.67	
Corning	97	45	74.6	11.08	
Dallas	......	......	......	4.87	
Dardanelle	......	......	......	6.32	
Elon †	96	50	76.6	5.61	
Fayetteville †	94	44	73.2	4.53	
Forrest	96	51	76.8	6.39	
Fulton †	......	......	......	2.56	
Hardy	97	49	74.0	9.41	
Helena *a* †	......	......	......	4.49	
Helena *b*	100	54	77.6	4.93	
Hot Springs *a*	100	53	76.8	5.05	
Hot Springs *b*	......	......	......	5.00	
Jonesboro	94	49	74.9	9.61	
Keesees Ferry †	96	42	73.2	6.72	
Lacrosse †	94	49	73.6	7.40	
Lonoke *[1]	99	53	76.4	8.18	
Lutherville *[1]	93	55	75.2	....	
Malvern †	102	48	75.1	6.55	
Marianna *[1]	98	56	77.2	......	
Marvell	98	54	77.2	6.28	
Mena *[1]	96	50	76.8	7.41	
Monticello	97	49	76.4	6.32	
Mossville	89	46	71.2	10.50	
Mount Nebo	89	54	71.4	6.71	
New Gascony	96	50	75.8	7.41	
Newport *a* †	......	......	......	11.64	
Newport *b*	96	50	74.9	12.53	
Newport *c* †	99	49	76.0	14.19	
Osceola	96	52	75.3	5.34	
Ozark †	98	52	75.9	5.48	
Picayune †	100	48	75.5	......	
Pinebluff †	99	55	77.8	9.01	
Pocahontas	93	50	74.2	11.34	
Pond	90	45	71.7	5.97	
Powell	98	51	75.1	5.74	
Prescott	100	51	76.8	3.40	
Rison	97	49	75.7	11.75	
Russellville	98	48	75.1	7.08	
Silver Springs †	92	43	72.3	5.45	
Spielerville	100	46	75.6	6.86	
Stuttgart †	97	48	75.3	7.45	
Texarkana †	99	52	77.6	5.17	
Warren †	98	50	76.4	7.81	
Washington *†[1]	94	54	76.1	4.66	
Wiggs *[1]	97	51	76.6	4.94	
Winslow	87	50	70.2	4.88	
Witts Springs †	93	45	71.1	7.57	
California.					
Agnew	84	42	62.1	1.38	
Anada	95	33	61.0	......	
Azusa	......	......	......	0.00	
Ballast Point L. H	......	......	......	0.05	
Bear Valley	......	......	......	0.73	
Berkeley	82	51	61.2	0.93	
Bishop	98	35	65.6	0.41	
Blue Lakes City	105	38	68.3	0.61	
Boca *[1]	86	25	50.5	0.01	
Bodie †	80	17	50.6	1.93	....
Bowmans Dam *[1]	86	32	57.4	0.55	
Caliente *[1]	100	60	72.3	0.10	
Colloway	......	......	......	1.30	
Campbell	85	40	60.6	1.21	
Cape Mendocino L. H	......	......	......	2.20	
Cedarville †	93	32	61.4	0.11	T.
Centerville *[1]	100	54	65.2	1.46	
Chico *[1]	100	55	75.0	0.40	
Chino *[5]	106	53	72.7	0.00	
Cisco *[1]	77	32	53.1	0.83	
Claremont †	103	48	71.8	T.	
Corning *[1]	100	53	69.2	0.38	
Coronado	86	64	70.9	0.00	
Craftonville	108	50	75.3	0.00	
Crescent City †	72	40	55.6	2.29	
Crescent City L. H	......	......	......	2.55	
Delano *[1]	105	58	76.3	2.78	
Delta *[1]	100	48	68.6	0.00	
Descanso	......	......	......	0.00	
Drytown	104	36	67.8	0.28	
Dunnigan *[1]	98	50	71.7	1.95	
Durham *[1]	96	54	71.1	0.35	
East Brother L. H	......	......	......	0.85	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
***California*—Cont'd.**					
Edmanton *[1]	92	35	59.0	0.26	
Elsinore	112	47	76.2	0.00	
Escondido	100	40	70.2	0.01	
Fallbrook *[1]	107[c]	50	68.4[c]	T.	
Folsom City *[1]	99	52	70.4	0.24	
Fordyce Dam	......	......	......	0.92	
Fort Bragg	......	......	......	1.77	
Fort Romie	104	37	63.8	0.04	
Fort Ross	74	45	57.8	2.98	
Fort Tejon	......	......	......	0.60	
Georgetown	93	44	67.2	0.53	
Glendora	......	......	......	0.05	
Goshen *[1]	101	53	81.4	3.55	
Grand Island *[5]	102	46	72.5	0.48	
Grass Valley	......	......	......	0.61	
Greenville †	98	23	58.3	0.30	
Healdsburg *[1]	90	38	65.4	0.76	
Hill Ranch	115	43	73.8	0.14	
Hollister	105	39	64.4	0.26	
Humboldt L. H	......	......	......	1.80	
Indio *[1]	109	68	86.8	0.00	
Iowa Hill *[1]	92	48	67.2	0.44	
Jackson	98	46	69.2	0.40	
Jolon	......	......	......	0.30	
Keene *[1]	99	46	63.8	0.03	
Kennedy Gold Mine	99	43	67.7	0.42	
Kernville	......	......	......	0.05	
King City *[1]	108	44	66.6	0.00	
Kingsburg *[5]	100	55	74.2	1.50	
Kono Tayee	90	50	68.0	0.51	
Lagrange *[5]	108	52	74.6	0.70	
Laporte *†[1]	83	32	54.5	0.94	2.5
Las Fuentes Ranch	......	......	......	4.09	
Lemoore *a* *[1]	102	41	71.6	1.23	
Lick Observatory	86	34	61.8	0.29	
Limekiln	109	40	74.4	......	
Lime Point L. H	......	......	......	1.01	
Lodi	98	49	69.0	0.60	
Los Alamos	......	......	......	1.38	
Los Gatos *b*	92	46	63.6	1.77	
Lytton Springs[c]	88[d]	48[d]	65.4[d]	0.63	
Malakoff Mine	90	42	64.6	0.58	
Mammoth Tank *[1]	111	75	92.9	0.00	
Manzana	102	46	73.9	T.	
Mare Island L. H	......	......	......	0.83	
Merced *[1]	103	53	74.1	0.53	
Mills College	......	......	......	1.10	
Milo	......	......	......	1.69	
Milton (near) *[1]	102	51	71.6	0.58	
Modesto *[1]	103	50	74.2	0.31	
Mohave *[1]	104	58	78.2	0.00	
Mokelumne Hill *[3]	......	50	66.7	0.44	
Monterey *[1]	81	50	63.3	0.79	
Mountain View	......	......	......	2.08	
Mount Frazier	......	......	......	1.20	
Mount Tamalpais	90	45	62.6	0.80	
Mutah Flat	......	......	......	2.00	
Napa *b*	102	42	65.0	0.59	
Needles	104	67	85.9	0.00	
Nevada City	86	38	61.4	0.37	
Newhall *[1]	108	52	71.4	0.14	
North Ontario	102	50	73.4	T.	
North San Juan *[1]	92	36	62.6	0.88	
Oakland *a*	81	50	60.7	1.16	
Ogilby *[1]	110	79	91.1	0.00	
Oleta *[1]	96	47	64.2	0.30	
Orland *[1]	103	58	75.7	0.40	
Palermo	100	43	70.3	0.34	
Paso Robles *b*	108	33	65.8	0.10	
Peachland *[5]	91	41	63.0	0.89	
Piedras Blancas L. H	......	......	......	0.50	
Pigeon Point L. H	......	......	......	0.85	
Pilot Creek	......	......	......	0.68	
Pine Crest	101	52	71.4	2.96	
Placerville	90	40	63.2	0.11	
Point Ano Nuevo L. H	......	......	......	0.92	
Point Arena L. H	......	......	......	0.87	
Point Bonita L. H	......	......	......	1.11	
Point Conception L. H	......	......	......	0.98	
Point Firmin L. H	......	......	......	0.15	
Point George L. H	......	......	......	0.94	
Point Hueneme L. H	......	......	......	0.60	
Point Lobos	67	50	56.8	1.00	
Point Loma L. H	......	......	......	0.00	
Point Montara L. H	......	......	......	2.72	
Point Pinos L. H	......	......	......	1.63	
Point Reyes L. H	......	......	......	0.80	
Point Sur L. H	......	......	......	2.04	
Pomona (near)	107	46	73.6	0.00	
Poway *[3]	104	58	66.8	0.05	
Quincy †	89	32	57.6	0.08	
Redding *b* †	100	49	72.2	0.13	
Redlands	109	50	76.8	0.01	
Represa	94	42	69.4	0.24	
Rio Vista	98	51	69.4	0.17	
Roe Island L. H	......	......	......	0.70	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. (Fahrenheit.) Minimum.	Temperature. (Fahrenheit.) Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
California—Cont'd.	°	°	°	Ins.	Ins.
Rosewood	102	41	67.7	0.26	
Sacramento *a*	92	45	66.8	0.36	
Salinas *1	80	50	61.0	0.00	
Salton *1	116	70	92.4	0.00	
San Bernardino †	106	44	72.6	0.00	
San Jacinto	107	44	74.3	0.00	
San Leandro *1	90	54	64.8	1.13	
San Luis L. H	......	......	......	0.12	
San Mateo *1	86	55	64.6	1.57	
San Miguel *1	104	54	67.7	0.02	
San Miguel Island	83	52	59.3	2.70	
Santa Barbara *a*	91	52	66.0	3.17	
Santa Barbara L. H	......	......	......	3.10	
Santa Clara *a*	......	......	......	1.34	
Santa Cruz *b* †	101	42	62.8	2.21	
Santa Cruz L. H	......	......	......	2.50	
Santa Maria	94	44	63.6	0.96	
Santa Monica *1	80	58	69.3	0.05	
Santa Paula	97	44	66.0	0.86	
Santa Rosa *1	92	44	62.0	0.02	
Saticoy	......	......	......	0.75	
Shasta	106	49	73.6	T.	
Sierra Madre	99	53	73.2	T.	
Sneddens Ranch *1	90	14	50.5	1.75	
Sonoma	......	......	......	0.36	
S. E. Farallone L. H	......	......	......	1.33	
Stanford University	89	44	62.7	1.56	
Stockton *a*	94	48	67.9	0.35	
Summerdale †	87	37	61.3	1.93	
Susanville †	87	31	59.8	0.10	
Tehama *1	97	53	67.1	0.53	
Tejon Ranch	......	......	......	0.28	
Templeton *1	105	50	66.3	0.15	
Thermalito	102	47	73.8	0.33	
Trinidad L. H	......	......	......	2.33	
Truckee *1	92	32	60.4	0.40	4.0
Tulare *b*	......	......	......	3.92	
Tulare *c*	112	48	72.6	3.75	
Turlock	94	53	78.0	0.66	
Ukiah	95	40	63.4	0.82	
Upperlake	102	44	67.7	0.60	
Upper Mattole *1	90	48	59.2	2.66	
Vacaville *a* *1	102	54	69.4	0.49	
Ventura †	87	38	60.7	1.10	
Visalia *1	102	60	72.8	3.56	
Volcano Springs *1	117	78	97.9	0.00	
Walnut Creek	94	46	69.7	0.89	
West Palmdale	......	......	......	0.00	
Westpoint	......	......	......	0.87	
Wheatland	97	44	68.6	0.27	
Williams *1	96	54	72.4	0.48	
Wilmington *1	99	56	63.9	T.	
Wire Bridge *5	98	47	69.3	0.60	
Yerba Buena L. H	......	......	......	1.20	
Yreka †	94	32	62.4	0.14	
Yuba City *5	91	58	72.2	0.41	
Colorado.					
Altman	76	13	50.7	1.17	10.0
Antlers †	89	33	62.2	0.23	
Arkins	......	......	......	0.51	
Boulder	85	34	62.1	1.12	1.0
Boxelder	......	......	......	1.36	T.
Breckenridge †	79	15	44.2	0.38	3.8
Canyon †	94	34	66.3	0.27	T.
Castlerock	85	28	57.2	1.35	4.0
Cedaredge	87	27	60.5	0.37	
Cheyenne Wells	95	32	62.2	1.92	5.6
Collbran	......	......	......	0.40	
Colorado Springs †	86	30	58.7	0.27	2.1
Cope	98	32	60.8	3.28	8.0
Crook	99	27	61.0	2.97	
Delta	92	29	61.6	0.55	
Dumont †	......	......	......	0.48	T.
Durango	88	27	59.1	0.30	
Fairview	83	25	52.4	0.61	T.
Fort Collins †	90	30	58.6	0.50	
Fort Morgan	97	29	61.0	0.43	
Fox	......	......	......	2.97	9.0
Garnett	80	12	48.8	T.	
Georgetown	75	24	53.8	......	
Gleneyrie †	83	26	57.6	0.40	3.5
Grand Junction †	85	38	64.5	0.10	
Greeley	93	30	59.6	0.13	
Gunnison	78	18	51.2	0.06	
Hamps	88	29	55.2	1.17	5.0
Hoehne	89	31	60.0	1.02	.....
Holly	......	......	......	1.61	T.
Holyoke	......	......	......	3.00	
Hugo	......	......	......	1.50	7.0
Husted †	95	29	59.2	0.49	2.5
Lake Moraine	71	8	47.8	0.63	6.0
Lamar †	99	32	64.5	1.60	T.
Laporte	......	......	......	0.55	
Las Animas †	95	24	62.7	1.70	T.
Leadville (near) *†1	69	28	51.5	0.20	0.5
Leroy †	93	32	61.3	1.27	1.0
Colorado—Cont'd.	°	°	°	Ins.	Ins.
Longs Peak	78	21	50.0	0.81	1.0
Loveland	......	......	......	0.34	
Meeker	83	19	54.4	0.03	
Millbrook	......	21	......	0.54	3.0
Minneapolis †	99	31	64.8	0.95	2.0
Moraine †	79	24	52.3	0.40	2.0
Pagoda †	89	19	54.8	0.05	
Paonia	......	......	......	0.03	
Parachute	90	30	64.8	0.23	
Perry Park	......	......	......	1.36	T.
Redcliff	......	......	......	0.70	
Rockyford	96	32	61.1	1.55	T.
Ruby	......	......	......	0.30	
Saguache †	78	25	53.8	0.00	
Salida	89	26	56.9	0.10	1.0
San Luis †	85 f	22 f	52.0 f	0.51	2.7
Santa Clara	......	......	......	2.09	13.0
Seguro	73	22	48.1	0.75	7.5
Seibert †	......	......	......	2.65	
Smoky Hill Mine	87	22	54.8	1.30	5.0
Springfield	......	......	......	0.97	T.
Stamford *1	72	16	44.6	1.45	......
Steamboat Springs	79	20	46.6	0.40	4.0
Strickler Tunnel	......	......	......	0.55	6.5
Trinidad	......	......	......	1.64	8.0
T. S. Ranch †	86	35	64.2	0.12	
Vilas	......	......	......	0.57	T.
Wagon Wheel	71	14	43.9	0.20	
Walden	85	16	51.9	0.04	0.1
Wallet	......	......	......	2.30	T.
Wray †	95	32	60.6	2.33	
Yuma	......	......	......	1.00	2.0
Connecticut.					
Canton †	92	34	63.5	2.31	
Colchester	91	38	64.8	2.61	
Falls Village	......	......	......	3.73	
Greenfield Hill	......	......	......	2.06	
Hartford *a*	91	42	65.5	2.93	
Hartford *b*	......	......	......	2.86	
Hawleyville	90	36	64.7	2.36	
Lake Konomoc	......	......	......	3.00	
New London †	89	44	65.6	3.33	
Norwalk	91	37	65.0	1.40	
Pomfret	89 d	43 d	60.2 d	2.12	
Southington	89	37	64.2	2.63	
South Manchester	......	......	......	2.83	
Storrs	90	37	63.9	2.22	
Voluntown †	92	34	64.2	2.65	
Wallingford	......	......	......	2.18	
Waterbury	94	36	66.0	2.52	
West Cornwall †	87	38	62.5	4.25	
West Simsbury	......	......	......	2.07	
Winsted *1	91	40	61.9	......	
Delaware.					
Dover	94	50	69.8	4.05	
Milford	97	48	72.2	2.13	
Millsboro	94	44	70.2	3.73	
Newark	94	45	68.4	2.57	
Seaford	94	50	70.8	4.28	
District of Columbia.					
Distributing Reservoir *5	90	52	71.0	0.93	
Receiving Reservoir *5	92	50	71.0	0.99	
West Washington	97	44	71.0	0.97	
Florida.					
Archer †	93	66	80.4	3.27	
Bartow	94	71	80.9	7.88	
Brooksville †	90	70	79.8	7.30	
Carrabelle †	91	67	80.1	4.70	
Clermont	95	67	81.0	2.01	
Crawfordville	......	......	......	3.95	
De Funiak Springs	......	......	......	6.70	
Earnestville	94	70	81.4	3.38	
Estero *1	89	71	79.5	......	
Eustis †	95	68	81.1	7.18	
Federal Point †	90	68	78.5	2.31	
Fort Meade	93	69	80.6	8.30	
Gainesville	93	62	79.8	3.47	
Grasmere †	92	70	81.2	3.61	
Haywood	......	......	......	4.23	
Homeland	94	71	82.3	......	
Huntington	93	69	79.8	2.93	
Kissimmee	94	68	81.0	4.52	
Lake Butler	95	68	81.2	2.00	
Lake City †	95	65	79.9	4.04	
Lakemont	97	69	82.4	6.49	
Lemon City	90	72	81.8	4.07	
Liveoak	95	66	80.8	3.16	
Macclenny †	97	65	80.0	3.65	
Manatee	95	67	79.8	10.37	
Merritts Island	90	71	81.3	3.97	
Myers †	93	70	80.8	10.73	
New Smyrna	90	68	79.6	1.19	
Oakhill *1	90	75	81.6	......	
Ocala †	95	67	80.1	4.31	
Orange City	93	71	80.6	4.05	
Orange Park	90	61	78.0	4.56	
Florida—Cont'd.	°	°	°	Ins.	Ins.
Orlando †	91	71	80.5	3.43	
Plant City	94	68	81.0	5.97	
St. Andrews	......	65	......	5.03	
St. Francis †	92	65	79.1	2.25	
St. Francis Barracks	88	71	79.1	3.16	
Sebastian	89	72	80.4	7.67	
Stephensville	91	......	......	7.59	
Switzerland *1	88 d	71 d	77.3 d	3.50	
Tallahassee †	95	62	79.9	2.63	
Tarpon Springs †	92	70	80.5	13.12	
Georgia.					
Adairsville	87	58	72.5	9.98	
Alapaha	94	62	77.8	1.47	
Albany †	93	60	77.4	0.72	
Allentown †	97	59	78.6	4.99	
Americus †	94	56	77.0	2.19	
Athens *b* †	90	56	73.2	6.36	
Bainbridge	98	62	80.0	3.03	
Bellville	96	59	77.2	3.15	
Blakely †	92	63	77.6	2.40	
Camak	91	56	74.9	5.30	
Canton †	......	......	......	6.89	
Cartersville	89	58	72.8	9.34	
Cedartown	90	55	71.6	7.31	
Clayton †	86	51	69.5	11.34	
Columbus	90	62	77.0	0.55	
Covington	86	56	71.2	5.33	
Crescent	89	57	76.6	4.36	
Dahlonega †	89	52	69.6	12.08	
Diamond	85	51	68.8	6.93	
Eastman	95	59	78.0	2.43	
Elberton †	90	54	73.9	5.63	
Fitzgerald	92	60	76.0	4.27	
Fleming †	95	59	77.8	5.18	
Fort Gaines	92	51	74.8	1.50	
Franklin	89	60	74.5	2.53	
Gainesville	86	56	71.1	6.71	
Gillsville †	93	55	74.7	10.13	
Greenbush	88	55	71.6	10.82	
Griffin	97	55	76.2	2.65	
Harrison	90	63	76.3	0.81	
Hephzibah *6	90	62	79.2	0.45	
Jesup	96	61	78.2	3.37	
Lagrange †	94	57	74.8	1.63	
Lawrenceville	......	......	......	5.15	
Louisville	95	56	76.6	5.93	
Lumpkin	89	60	76.6	0.42	
Macon	92	61	76.2	4.17	
Marietta	86	55	71.2	8.59	
Marshallville †	90	60	77.5	1.34	
Mauzy	92	63	78.0	2.60	
Millen	96	58	77.5	9.14	
Mount Vernon	92	61	77.5	2.10	
Newnan	88	57	72.6	2.81	
Point Peter	92	53	73.2	2.59	
Poulan †	95	59	77.4	2.59	
Quitman †	92	62	78.0	3.55	
Ramsey	90	55	72.0	8.44	
Rome †	89	58	73.0	7.49	
Talbotton †	88	59	72.5	1.12	
Tallapoosa	87	58	71.8	4.91	
Thomasville †	94	64	79.6	3.99	
Toccoa †	90	55	73.2	11.98	
Union Point	87	56	73.1	6.42	
Washington †	94	55	74.6	4.22	
Waycross	92	63	78.5	5.01	
Waynesboro	90	53	73.9	6.13	
Westpoint	93	57	75.1	2.98	
Idaho.					
Albany Falls	84	29	54.7	1.23	
American Falls	93	31	60.2	0.00	
Atlanta	87	25	53.0	0.56	
Blackfoot †	88	28	55.6	0.00	
Boise Barracks	93	32	60.4	0.01	
Burnside †	84	21	56.2	T.	
Corral *1	85	27	54.2	T.	
Downey	90	21	55.6	0.33	T.
Fort Sherman †	91	31	56.9	1.68	
Gray	77	26	50.6	0.30	
Lake	72	20	54.0	0.00	
Lakeview	79	39	57.2	1.31	
Lewiston	88	41	68.0	0.35	
Lost River	85	21	54.6	0.25	
Marysville	87	10	53.1	0.09	
Minidoka	99	17	59.6	0.00	
Moscow	94	31	58.6	1.30	
Murray †	84	33	52.2	2.53	
Oakley	96	30	61.8	0.00	
Ola	88	25	58.4	0.24	
Paris	88	27	56.2	0.20	
Payette	100	28	65.3	0.80	
Pollock †	94	31	60.5	0.51	
St. Maries	91	32	58.0	1.16	
Salubria	95	24	59.9	0.18	
Soldier †	89	19	53.9	0.04	
Swan Valley †	87	19	51.2	0.16	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. (Fahrenheit.) Minimum.	Temperature. (Fahrenheit.) Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
Idaho—Cont'd.	°	°	°	*Ins.*	*Ins.*
Warren†	90	26	54.6	1.25	
Weston	90	25	58.4	0.27	
Illinois.					
Albion†	98	47	72.4	3.57	
Alexander†	98	45	72.0	5.19	
Ashton*†[1]	90	48	65.7	3.61	
Astoria	91	47	68.4	6.68	
Atwood *b*	......	......	......	4.86	
Aurora *a*	93	41	68.0	4.25	
Aurora *b*	93	40	66.5	4.29	
Bloomington	97	48	71.3	6.49	
Bushnell	98	46	70.5	6.23	
Cambridge	87	45	66.8	2.72	
Carlinville†	96	46	72.4	5.39	
Carlyle	......	......	......	2.87	
Carrollton	93	40	70.0	4.24	
Charleston	94	46	71.0	4.46	
Chemung	90	35	63.6	2.72	
Chester	......	......	......	3.33	
Cisne†	95	43	71.8	4.35	
Coatsburg	95	45	68.6	8.89	
Cobden†	95	47	72.8	5.21	
Cordova	90	44	65.9	3.38	
Danville	94	46	70.0	4.00	
Decatur†	96	45	71.1	5.47	
Dixon†	94	41	67.2	3.01	
Dwight†	96	38	67.6	4.86	
Effingham†	96	44	71.7	5.26	
Elgin	91	40	66.0	4.40	
Equality	98	47	75.1	4.32	
Flora	94	46	72.0	4.76	
Fort Sheridan	94	41	67.6	2.48	
Friendgrove†	......	......	......	3.54	
Galva†	91	41	67.1	3.84	
Glenwood*[1]	95[e]	52[e]	68.8[e]	3.43	
Grafton†	......	......	......	4.53	
Grayville	97	48	74.2	2.83	
Greenville†	96	49	71.8	3.80	
Griggsville†	95	47	71.0	6.83	
Halliday*[3]	93	49	73.4	2.87	
Havana†	92	50	70.8	6.92	
Henry	93	42	68.4	6.91	
Hillsboro†	98	47	72.1	5.56	
Joliet†	93	40	67.4	3.20	
Kankakee *a*	95	40	68.0	5.80	
Kishwaukee	90	33	63.7	3.49	
Knoxville	95	44	67.5	5.69	
Lagrange†	92	39	66.0	3.97	
Laharpe	93	47	69.4	6.42	
Lanark†	90	35	63.6	3.66	
Lexington	95	43	68.4	5.23	
Loami†	......	......	......	6.75	
McLeansboro†	97	45	73.4	2.75	
Martinsville	98	45	71.3	4.90	
Martinton†	96	40	68.9	5.77	
Mascoutah	97	46	72.0	3.80	
Mattoon	98	45	69.2	4.49	
Minonk†	95	43	67.7	5.47	
Monmouth†	92	41	67.8	7.15	
Morrisonville†	90	40	69.0	4.60	
Mount Carmel†	......	......	......	3.64	
Mount Pulaski	97	46	70.9	5.14	
Mount Vernon	96	40	70.0	4.54	
New Burnside†	99	44	74.2	4.33	
Olney *a*	95	43	71.8	4.41	
Oswego*[1]	90	38	65.0	3.81	
Ottawa†	94	39	67.4	5.90	
Palestine†	94	42	69.4	7.42	
Pana	96	46	71.0	3.90	
Paris	97	45	70.8	4.71	
Peoria *a*†	......	......	......	6.11	
Peoria *b*†	94	47	69.9	6.05	
Philo†	96	40	69.2	5.23	
Plumhill†	98	46	72.8	3.93	
Rantoul†	96	43	69.6	3.86	
Raum	95	52	73.6	7.68	
Reynolds	90	48	67.0	2.76	
Riley†	89	44	66.0	2.16	
Robinson	97[d]	43[d]	71.6[d]	10.09	
Roundgrove†	94	42	67.0	2.68	
St. Charles*†[1]	90	47	64.4	3.87	
St. John†	95	45	74.0	3.60	
Scales Mound	90	34	63.1	2.62	
Streator†	96	46	70.0	4.20	
Sycamore†	90	38	64.6	3.71	
Tilden	96	45	73.5	4.81	
Tiskilwa†	92	41	66.8	4.58	
Tuscola†	97	44	69.8	4.82	
Walnut†	92	45	68.2	4.47	
Wheaton*[3]	......	46	62.8	4.65	
Winchester*[1]	92	48	70.3	5.62	
Winnebago†	89	37	65.7	2.47	
Indiana.					
Anderson†	93	39	69.2	2.56	
Angola	91	43	65.4	4.36	
Auburn	95	37	66.2	3.41	
Indiana—Cont'd.					
Bedford	96	42	69.4	0.86	
Bluffton†	97	36	69.2	2.88	
Boonville	99	46	74.6	2.95	
Bright	96	46	70.6	4.55	
Butlerville†	96	42	70.7	4.59	
Cambridge City†	94	36	68.0	3.91	
Columbia City*[1]	93	47	65.9	3.17	
Columbus†	94	42	69.2	6.69	
Connersville†	96	40	70.0	3.63	
Crawfordsville	99	45	72.0	3.10	
Delphi†	96	39	68.6	2.39	
Edwardsville*†[1]	94	54	73.6	4.31	
Fort Wayne	96	39	67.9	5.26	
Greensburg	95	52	72.4	8.28	
Hammond†	94	35	66.6	1.53	
Hector	93	38	67.4	3.64	
Huntington	95	42	68.2	3.97	
Jeffersonville	94	49	72.6	3.66	
Knightstown†	95	41	69.2	4.41	
Kokomo†	93	43	68.6	2.28	
Lafayette†	95	43	68.6	3.03	
Laporte[a]	94	42	66.9	2.56	
Logansport *b*†	94	43	67.6	1.97	
Madison	93	45	72.2	4.34	
Marengo†	98	45	71.5	5.95	
Marion†	97	38	69.4	2.47	
Markle	93	39	68.0	2.70	
Mauzy†	96	40	70.0	4.27	
Michigan City*[10]	95	42	64.5	......	
Mount Vernon†	96	49	73.8	......	
Northfield†	92	39	67.6	3.07	
Paoli	96	42	70.6	5.94	
Princeton*[1]	98	46	71.2	5.82	
Richmond	95	37	68.6	3.17	
Rockport	95	50	73.6	3.91	
Rockville†	95	45	69.4	6.12	
Scottsburg	96	46	72.1	5.51	
Shelbyville	93	47	70.3	6.04	
South Bend†	93	43	67.7	1.81	
Syracuse†	......	......	......	2.75	
Terre Haute†	97	50	71.4	6.75	
Topeka†	90	32	61.2	4.06	
Valparaiso†	92	38	66.2	2.51	
Vevay	95	49	75.6	4.40	
Vincennes	99	48	73.4	3.79	
Warsaw	94	45	66.8	3.65	
Washington†	100	45	73.0	7.98	
Winamac	94	33	68.7	3.53	
Worthington†	98	42	71.3	7.87	
Indian Territory.					
Healdton†	104	43	77.7	1.16	
Kemp	102	49	76.6	T.	
Lehigh†	98	46	75.7	1.17	
Purcell	101	42	74.1	0.99	
South McAlester†	......	......	......	3.11	
Tulsa†	......	......	......	4.42	
Wagoner	99	45	75.0	5.99	
Webbers Falls	......	......	......	7.00	
Iowa.					
Adair	......	......	......	2.77	
Afton	97	42	66.8	3.29	
Albia	91	42	67.7	3.07	
Algona*[1]	90	40	64.1	1.19	
Alta *a*†	93	38	64.1	1.02	
Amana†	93	43	65.6	4.14	
Ames *b*	96	40	65.1	3.07	
Ames (near)	......	......	......	2.90	
Atlantic†	95	35	64.6	2.72	
Audubon	93	40	64.2	2.26	
Belknap	92	46	68.4	5.00	
Belleplaine	95	41	64.3	5.87	
Bonaparte†	93	45	68.2	7.30	
Britt	93	29	62.3	1.88	
Carroll	95	38	64.6	4.77	
Cedarfalls	94	40	65.2	2.22	
Cedar Rapids†	95	44	67.3	3.11	
Centerville	92	42	68.2	3.00	
Chariton	93	43	67.6	4.26	
Charles City	95	33	64.2	1.13	
Clarinda†	97	......	......	5.74	
Clear Lake	92	36	63.0	1.85	
Clinton	91	44	66.4	2.80	
College Springs	96[j]	41	70.9[e]	4.82	
Corning†	94	39	67.0	3.34	
Council Bluffs	97	46	68.0	3.81	
Cresco†	95	34	63.6	1.03	
Decorah†	95	31	64.0	1.73	
Delaware*[3]	93	44	62.2	3.47	
Dows	93	35	63.3	2.69	
Eldon	95	43	69.0	5.07	
Eldora	......	......	......	2.52	
Elkader†	97	32	65.2	2.50	
Estherville	97	29	59.6	0.41	
Fairfield†	93	42	67.6	3.61	
Fayette†	93	31	63.4	1.86	
Forest City	92	34	63.9	0.68	
Iowa—Cont'd.					
Fort Madison	......	......	......	8.45	
Fredericksburg	......	......	......	1.57	
Galva	99[i]	35[i]	65.7[i]	1.48	
Glenwood†	97	41	68.1	2.80	
Grand Meadow*[1]	92	42	63.5	1.99	
Greene	98	34	65.8	1.56	
Greenfield	94	38	66.6	2.48	
Grinnell	90	44	65.7	2.05	
Grundy Center	93	38	63.1	3.41	
Guthrie Center	96	40	66.2	2.39	
Hampton	93	36	63.8	3.11	
Hawkeye	......	......	......	2.63	
Hedrick*[1]	93[e]	40[f]	65.8[e]	2.09	
Hopeville†	98	44	67.4	4.63	
Humboldt†	92	37	62.8	1.80	
Independence†	94	37	64.2	2.14	
Indianola†	94	42	67.9	1.99	
Iowa City *a*	96	44	66.6	2.54	
Iowa Falls†	93	36	63.1	2.69	
Keosauqua	93	47	68.4	7.22	
Knoxville	92	44	67.6	2.14	
Lamoni	94	41	66.4	5.62	
Lansing	95	35	65.2	2.64	
Larchwood	......	......	......	0.98	
Larrabee†	94	32	63.4	0.96	
Leclaire	......	......	......	2.67	
Lemars	94	33	64.2	0.70	
Lenox	92	42	66.6	4.87	
Logan†	98	40	65.2	1.72	
Maple Valley	......	......	......	1.11	
Maquoketa	91	39	64.1	2.99	
Marshall†	95	40	65.2	2.48	
Mason City	94	34	62.4	1.90	
Millman	......	......	......	1.93	
Monticello	95	39	66.5	3.59	
Mooar	93	44	68.6	7.04	
Mountayr	94	44	67.0	5.36	
Mount Pleasant*[1]	83	52	69.6	4.42	
Mount Vernon *a*	92	42	65.4	3.30	
Neola	92	36	65.8	1.50	
New Hampton	93[e]	......	......	1.41	
Newton†	93	43	66.6	2.82	
North McGregor	......	......	......	1.57	
Northwood	93	31	62.2	0.88	
Odebolt	96	35	65.0	2.09	
Ogden	94	39	65.6	3.91	
Olin	90	42	64.2	3.35	
Osage*[3]	......	37	59.8	1.20	
Osceola	93	43	66.2	3.09	
Oskaloosa†	95	40	66.9	2.21	
Ottumwa	93	45	67.6	2.98	
Ovid†	94	41	67.0	4.45	
Pella	87	42	64.2	1.89	
Plover	95	35	64.4	1.06	
Primghar	......	......	......	0.55	
Red Oak	95	44	66.6	3.83	
Ridgway	94	41	65.5	1.51	
Rockwell City	94	38	63.8	2.16	
Ruthven	94	35	64.0	1.50	
Sac City†	92	35	62.3	2.00	
St. Charles	95	44	67.5	1.89	
Sibley	95	29	62.9	0.67	
Sidney	94	44	67.4	5.40	
Sigourney	95	38	68.0	2.83	
Spencer	94	29	61.8	0.94	
Spirit Lake†	93	34	64.6	0.50	
Stuart	93	42	66.4	2.23	
Tara	95	40	63.6	2.45	
Thurman	95	38	67.1	3.95	
Toledo	92	39	64.2	4.64	
Villisca	93	36	65.4	4.15	
Vinton*[1]	93	42	64.7[e]	2.48	
Wapello	91	44	67.0	1.76	
Washington	92	41	66.4	2.46	
Washta	......	......	......	1.40	
Waterloo	96	39	65.2	2.07	
Waverly	94	37	65.0	1.76	
Webster City	94	41	64.4	2.65	
Westbend*†[1]	94	35	61.6	1.13	
West Branch	91	44	66.1	2.12	
West Union	......	......	......	1.97	
Whitten*[1]	94	40	62.2	2.33	
Wilton Junction†	92	42	65.4	2.72	
Winterset†	93	40	64.7	2.45	
Kansas.					
Abilene†	103	38	71.6	4.30	
Achilles	......	......	......	5.64	6.0
Altoona*[3]	98	44	69.3	7.21	
Anthony	......	......	......	0.91	
Atchison†	93	46	70.4	7.43	
Augusta	98	40	72.4	0.97	
Baker	96	44	66.8	7.02	
Beloit†	100	37	68.2	5.40	
Burlington†	96	41	71.5	5.98	
Campbell	101	......	......	2.41	
Chanute	97[d]	42[d]	72.6[d]	7.56	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Colby†	98	28	62.8	3.00	
Columbus	93	43	71.5	6.50	
Coolidge†	98	31	63.9	1.75	
Cunningham†	105	35	71.3	2.11	
Delphos	103	39	71.2	3.51	
Dresden	96	32	64.0	5.63	
Ellinwood *[2]	99	42	66.2	3.94	
Emporia	94	47	70.3	3.50	
Englewood†	106	38	70.0	1.23	
Eskridge	96	46	71.3	1.96	
Eureka	......	......	......	3.25	
Eureka Ranch†	102	33	66.8	6.53	
Fallriver	97	38	73.2	4.42	
Fanning	......	......	......	9.39	
Fort Riley†	99	40	72.1	3.47	
Fort Scott†	96	45	72.8	4.97	
Frankfort	100	38	70.0	4.10	
Garden City	97	31	65.4	4.24	
Gibson	101	32	66.2	5.53	
Gove*[1]	97	34	69.5	4.54	
Grenola	97	39	71.2	3.77	
Halstead	96	36	68.1	1.21	
Hays	100	35	67.2	7.21	
Horton	95	45	69.4	5.53	
Hoxie	99	31	63.2	4.16	
Hutchinson	......	......	......	3.46	
Independence	97	44	73.6	5.43	
Lawrence	93	39	70.4	5.78	
Lebanon	100	40	67.9	3.60	
Lebo†	96	43	71.4	6.29	
Macksville	104	35	68.8	3.38	
McPherson	103	38	72.4	3.75	
Manhattan *b*	102	40	72.1	2.92	
Manhattan *c*	102[e]	36	70.2[e]	2.75	
Marion†	99	43	71.9	3.45	
Meade†	108	40	69.8	1.57	
Medicine Lodge†	102	39	70.6	2.45	
Minneapolis†	105	37	70.2	3.60	
Morantown†	93	42	71.8	5.68	
Mounthope*[1]	97	45	70.4	1.40	
Ness City	98	42	69.7	5.19	
Norwich	......	......	......	2.01	
Oberlin	......	......	......	5.61	1.0
Olathe†	95	43	71.0	4.19	
Osage City†	95	41	63.1	6.19	
Osborne	......	......	......	4.50	
Ottawa	96	40	69.5	4.07	
Phillipsburg	104	30	67.5	5.20	
Pratt	100	39	68.3	2.34	
Rome*†[1]	98	45	71.5	1.08	
Russell	100	39	68.9	4.50	
Salina†	106	37	71.4	3.08	
Scott	98	......	......	3.62	
Sedan†	98	43	73.2	5.66	
Toronto	100	36	72.2	5.94	
Ulysses	......	......	......	1.10	
Viroqua†	98	33	66.0	1.28	T.
Wallace	......	......	......	1.33	1.0
Wamego*[1]	99	42	69.3	4.01	
Winfield	101	42	74.1	0.96	
Winona	......	......	......	1.50	
Yates Center	97	36	71.2	5.33	
Kentucky.					
Alpha*[3]	......	52	71.8	6.36	
Ashland	96	46	71.8	......	
Bardstown†	99	45	74.6	4.78	
Blandville†	91	49	73.0	9.20	
Bowling Green *b*†	95	47	74.8	3.32	
Burnside†	......	......	......	4.42	
Caddo	99	46	72.4	2.90	
Canton*[1]	95	50	73.7	4.44	
Carlisle	98[d]	48[d]	74.0[d]	1.50	
Carrollton	98	52	75.0	4.61	
Catlettsburg	......	......	......	2.10	
Earlington	96	46	73.4	4.56	
Edmonton†	90	45	71.0	3.62	
Ensor	95	48	73.1	3.67	
Eubank	94	43	70.8	7.69	
Falmouth†	......	......	......	2.44	
Fords Ferry	98	45	74.4	4.36	
Frankfort	......	......	......	3.04	
Georgetown	90	48	71.5	......	
Greensburg†	98	45	73.2	4.90	
Henderson†	99	50	74.8	4.99	
Hopkinsville†	97	50	75.3	4.24	
Irvington	96	48	72.6	3.50	
Leitchfield†	95	47	72.8	6.12	
Loretto	97	42	72.9	3.82	
Maysville	100	42	73.7	2.98	
Middlesboro†	93	50	72.0	4.82	
Mount Hermon	93	47	72.8	4.53	
Mount Sterling†	93	44	72.0	2.77	
Owensboro†	95	48	73.0	3.63	
Owenton†	95	48	72.8	4.42	
Paducah *a*†	......	......	......	5.35	
Paducah *b*†	100	54	76.4	7.83	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Princeton	97	47	74.3	6.81	
Richmond†	93	46	72.2	5.15	
Russellville†	103	45	76.2	3.55	
St. John†	95	46	72.0	5.35	
Scott	94	45	73.0	3.11	
Shelby City	97	44	73.1	5.93	
Shelbyville†	100	44	73.4	5.20	
Vanceburg	93	46	70.9	3.80	
Williamsburg†	92	53	73.6	3.40	
Woodburn	......	......	......	4.25	
Louisiana.					
Abbeville	92	62	78.4	8.47	
Alexandria†	96	57	77.6	6.77	
Amite†	96	63	79.0	8.82	
Bastrop†	98	51	78.0	6.53	
Baton Rouge†	96	63	79.1	9.32	
Calhoun	93	54	75.9	4.62	
Cheneyville†	96	60	77.9	10.10	
Clinton†	93	62	78.4	7.08	
Como	96	55	76.2	11.63	
Covington	95	65	78.6	14.65	
Donaldsonville	94	63	79.0	14.20	
Elm Hall	87	62	74.6	15.65	
Emilie	91	65	77.2	16.42	
Farmerville	96	54	76.0	4.55	
Franklin†	98	73	82.4	17.46	
Grand Coteau	95	60	78.6	8.14	
Hammond	95	64	78.9	11.65	
Houma	94	67	79.7	18.70	
Jeanerette	96	61	78.6	15.06	
Jennings	95	61	78.9	13.85	
Lafayette	99	62	78.4	12.20	
Lake Charles†	96	64	79.0	5.29	
Lake Providence	95	58	79.0	8.59	
Lawrence	97	72	81.0	15.29	
Liberty Hill	100	55	77.7	4.39	
Mansfield	95	53	76.6	5.40	
Melville	94	60	78.3	9.40	
Minden	97	56	78.0	3.20	
Monroe†	95	52	77.8	4.67	
Montgomery	97	57	77.2	3.85	
New Iberia	92	63	78.0	9.90	
Oakridge	99	52	77.8	7.61	
Opelousas	94	60	78.2	6.32	
Paincourtville†	94	64	78.8	17.59	
Plain Dealing†	96	49	75.4	3.45	
Plaquemine	97	64	79.0	10.74	
Rayne	100	62	79.3	14.90	
Robeline	96	51	75.4	3.05	
Schriever	99	65	79.6	11.57	
Shellbeach	91	64	78.8	11.00	
Southern University†	94	66	76.9	15.00	
Sugar Ex. Station†	92	62	78.7	19.55	
Venice†	90	71	79.2	14.47	
Wallace	95	65	79.0	16.81	
White Sulphur Springs	97	56	76.0	13.75	
Maine.					
Bar Harbor	86	35	60.8	3.55	
Belfast*[6]	79	42	59.3	3.17	
Calais	82	31	58.0	3.19	
Cornish*[1]	85	37	60.4	3.69	
Cumberland Mills	94	35	62.4	4.49	
Fairfield	84	33	60.2	2.37	
Farmington	87	31	59.6	2.82	
Flagstaff	85	29	57.6	3.21	
Gardiner	88	37	62.7	2.90	
Kineo	75	37	58.6	4.50	
Lewiston	90	40	62.8	3.04	
Mayfield	83	29	56.6	3.57	
North Bridgton	91	38	62.4	3.09	
Orono	85	29	58.3	2.29	
Petit Menan*[1]	66	45	55.1	......	
Winslow	88	31	60.3	2.77	
Maryland.					
Annapolis	98	51	71.2	1.35	
Bachmans Valley	95	38	67.0	1.83	
Boettcherville	99	34	67.4	1.61	
Charlotte Hall†	99	40	71.5	1.69	
Cherryfields†[2]	......	......	72.2	2.31	
Chestertown	90	49	69.6	3.11	
Collegepark	98	41	71.6	0.56	
Cumberland *b*	93	47	70.0	1.33	
Darlington†	91	48	67.7	3.23	
Deerpark	90	29	60.6	1.87	
Denton	95	43	73.1	2.42	
Easton†	96	43	71.5	1.32	
Ellicott City	95	45	68.8	1.33	
Fallston	91	47	67.6	2.51	
Frederick	96	41	69.8	1.37	
Frostburg	......	38	......	1.96	
Grantsville	91	34	62.6	1.51	
Greatfalls	95	44	69.6	1.33	
Greenspring Furnace	94	41	68.0	1.15	
Hagerstown[f]	92	40	68.0	1.18	
Hancock	95	40	68.0	1.05	
Jewell†	95	45	70.0	2.98	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Johns Hopkins Hospital	98	49	70.7	1.64	
Laurel	100	52	74.4	0.98	
Mount St. Marys Coll.†	95	48	69.2	1.17	
New Market	96	40	70.2	1.28	
Pocomoke City	94	49	73.3	......	
Port Deposit	96	49	71.0	2.30	
Princess Anne	91	41	69.6	3.37	
Sharpsburg	95	41	69.6	0.97	
Smithsburg	95	40	68.2	0.51	
Solomons†	94	52	74.4	2.88	
Sunnyside	88	29	60.9	2.92	
Taneytown†	94	42	69.6	1.98	
Van Bibber	95	49	68.6	2.62	
Westernport	94	40	67.2	1.76	
Woodstock	94	42	68.4	1.55	
Massachusetts.					
Adams	93	20	57.4	......	
Amherst	90	35	63.2	3.48	
Attleboro	......	......	......	2.79	
Bedford	87	40	63.6	2.64	
Bluehill (summit)	89	39	64.4	3.02	
Cambridge *a*	90	40	65.6	1.72	
Chestnut Hill	92	40	66.2	1.77	
Cohasset	......	......	......	2.12	
Concord	91	36	63.8	2.34	
Dudley[1]	91*	35	64.4	......	
East Templeton*[1]	88	42	61.8	3.18	
Fallriver	91	42	66.4	1.25	
Fiskdale	......	......	......	3.42	
Fitchburg *a**[1]	88	42	62.3	2.77	
Fitchburg *b*	91	36	64.4	2.54	
Framingham	92	39	65.6	2.09	
Groton	90	36	62.6	3.41	
Hyannis*†[1]	88	45	64.2	0.84	
Jefferson	......	......	......	3.15	
Lawrence	91	41	65.0	2.67	
Leeds	91	35	62.1	3.22	
Leominster	......	......	......	4.83	
Long Plain	......	......	......	1.84	
Lowell *a*	92	40	65.0	1.97	
Lowell *b*	90	38	64.3	......	
Ludlow	89	30	60.2	3.20	
Lynn *a*	88	42	63.1	2.41	
Mansfield*[1]	90	31	62.5	3.98	
Middleboro	90	34	63.6	2.12	
Monson	90	36	64.1	3.30	
New Bedford *a*	90	43	64.8	1.28	
New Bedford *b*	91	38	64.8	2.24	
New Salem	90	36	62.9	5.01	
Pittsfield	86	35	61.7	2.41	
Plymouth*[1]	87	48	67.3	1.36	
Princeton	......	......	......	3.05	
Salem	......	......	......	2.32	
Somerset*[1]	102	36	67.6	2.73	
South Clinton	......	......	......	3.22	
Springfield Armory	91	34	63.0	2.73	
Sterling	......	......	......	3.18	
Taunton *b*	93	33	63.4	2.66	
Taunton *c*	93	33	63.7	3.04	
Turners Falls	91	37	62.8	3.73	
Webster	......	......	......	3.27	
Westboro†	90	36	65.4	2.61	
Weston	88	37	63.1	2.47	
Williamstown	86	36[d]	60.1	3.22	
Winchendon	......	......	......	4.16	
Worcester *a*	87	42	66.4	2.59	
Worcester *b*	......	......	......	3.05	
Michigan.					
Adrian	95	41	65.2	4.47	
Agricultural College	96	32	63.3	3.00	
Allegan	94	35	64.9	3.66	
Alma	94	33	63.6	4.83	
Ann Arbor	98	36	65.4	4.03	
Arbela	96	33	64.6	1.56	
Badaxe	94	36	64.6	1.68	
Baldwin	93	27	61.2	1.84	
Ball Mountain	98	37	64.8	3.38	
Baraga	97	28	58.2	2.10	
Battlecreek	95	37	65.8	2.50	
Bay City *b*	93	36	64.1	1.97	
Berlin	98	32	63.9	3.16	
Berrien Springs	97	44	68.0	3.02	
Big Point Sable*[10]	82	44	64.2	......	
Big Rapids	89	30	61.0	2.62	
Birmingham	97	32	64.6	3.07	
Boon	89	28	59.6	2.68	
Calumet	85	40	58.2	2.87	
Camden	97	39	65.7	3.82	
Carsonville	98	30	65.0	2.08	
Charlevoix	92	43	63.4	2.43	
Cheboygan	95	33	62.3	1.80	
Clinton	97	37	66.0	4.28	
Coldwater	97	37	65.2	4.61	
Crisps*[10]	86	43	60.2	......	
East Tawas	92	35	62.6	1.48	
Eloise	97	38	65.8	2.77	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. (Fahrenheit.) Minimum.	Temperature. (Fahrenheit.) Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Escanaba†	86	34	61.4	2.06	
Ewen	94	22	57.5	1.78	
Fairview	94	32	64.6	2.86	
Fitchburg	95	32	63.6	2.86	
Flint	96	32	63.8	1.84	
Frankfort	82	41	63.5	1.65	
Gladwin	91	31	61.5	2.00	
Grand Rapids *b*	95	36	65.7	4.13	
Grape	98	39	66.7	3.40	
Grayling	94	30	59.4	2.00	
Grindstone City *[10]	94	40	65.2	......	
Hanover	96	36	64.5	4.29	
Harrisville	95	35	62.7	3.66	
Hart	93	34	63.2	1.91	
Hastings	95	30	63.7	4.58	
Hayes	94	32	63.4	1.26	
Highland Station	......	......	......	2.89	
Hillsdale	93	38	64.9	4.30	
Holland *[10]	85	48	66.7	......	
Howell	......	......	......	2.10	
Humboldt	91	18	55.9	2.79	
Ionia	96	30	63.1	2.75	
Ishpeming	93	29	58.6	3.00	
Ivan	93	34	61.1	2.09	
Jackson	95	38	65.3	2.55	
Jeddo	97	33	64.4	1.90	
Kalamazoo	95	39	66.3	2.57	
Lake City	90	34	61.3	2.50	
Lansing	94	35	63.6	2.50	
Lapeer	96	29	63.0	1.66	
Lathrop	94	26	56.9	2.69	
Ludington	85	30	61.1	2.38	
Luzerne	92	31	59.2	2.24	
Mackinaw City	91	35	60.9	2.54	
Madison	97	42	66.6	2.88	
Mancelona	92	33	60.3	1.55	
Manistee	91	......	......	1.20	
Manistique	78	33	58.3	1.82	
Middle Island *[10]	88	49	62.1	......	
Midland	95	39	63.7	1.20	
Mottville	95	38	65.8	4.38	
Mount Clemens	98	35	65.3	6.10	
Mount Pleasant	94	40	62.9	1.99	
Muskallongee Lake *[10]	87	40	60.6	......	
Muskegon	87	38	63.8	2.55	
Newberry	90	26	56.9	2.53	
North Manitou Island *[10]	85	46	67.0	......	
Northport	94	39	63.2	2.99	
Old Mission	91	43	64.6	3.21	
Olivet	91	39	62.6	2.88	
Omer	92	27	60.2	2.84	
Ottawa Point *[10]	90	44	63.9	......	
Ovid	96	33	64.4	2.94	
Owosso	99	32	65.7	2.82	
Parkville	......	......	......	3.50	
Pentwater *[10]	90	48	67.6	......	
Petoskey	93	37	62.0	2.84	
Plymouth	97	36	63.0	2.39	
Pointe aux Barques *[10]	96	43	65.9	......	
Point Betsey *[10]	80	49	63.9	......	
Port Austin	93	38	63.9	1.60	
Powers	94	30	59.1	......	
Reed City	92	32	60.9	3.94	
Rockland	93	35	59.6	2.11	
Rogers [f]	94	35	62.3	......	
Romeo	80[d]	38[d]	61.5[d]	2.24	
Saginaw	96	34	65.1	2.61	
St. Ignace	90	35	61.0	1.94	
St. Johns	96	37	65.4	2.07	
St. Joseph	92	42	67.1	1.62	
Sandbeach	95	37	63.4	1.05	
Sidnaw [3]	94	34*	57.8	1.93	
Somerset	94	38	64.8	3.08	
South Haven	92	38	65.6	5.04	
Stanton	94	32	62.4	4.53	
Sturgeon Point *[10]	93	40	63.6	......	
Thomaston	95	22	58.2	1.46	
Thornville	97	36	65.6	1.41	
Thunder Bay Island *[10]	90	44	62.7	......	
Traverse City	94	37	62.1	1.46	
Two Heart River *[10]	88	40	60.2	......	
Vandalia	93	42	66.4	3.66	
Vassar	97	28	63.3	1.29	
Vermillion Point *[10]	82	36	54.7	......	
Wasepi	91	38	64.6	3.53	
Waverly	94	30	62.8	4.86	
West Harrisville	90	34	61.1	3.02	
Wetmore	90	30	58.5	1.75	
White Cloud	95	28	62.2	2.66	
Williamston	98	33	63.5	3.25	
Ypsilanti	96	40	64.3	4.01	
Minnesota.					
Ada†	89	25	57.9	1.15	
Albert Lea	93	34	62.2	0.40	
Alexandria†	96	33	61.0	1.94	
Beardsley	99	25	60.2	0.99	
Minnesota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bermidji	87	33	59.4	1.96	
Bird Island	96	31	61.9	1.15	
Blooming Prairie†	94	29	62.4	0.40	
Caledonia†	94	36	63.0	1.94	
Camden	93	33	61.2	1.28	
Campbell	98	25	59.4	1.20	
Collegeville	92	37	63.0	2.00	
Crookston†	84	30	57.6	2.22	
Deephaven	......	......	......	0.88	
Detroit City	92	29	57.0	2.75	
Faribault	95	32	66.6	0.60	
Farmington†	98	25	59.4	0.91	
Glencoe	93	......	......	0.96	
Grand Meadow†	94	33	62.0	0.98	
Granite Falls	95	30	61.0	1.10	
Koochicking	79	29	55.5	4.56	
Lake City	99	32	63.9	0.74	
Lake Jennie	93	35	62.7	0.92	
Lakeside†	92	33	61.0	1.14	
Lake Winnibigoshish	89	28	56.7	3.83	
Leech Lake	91	28	58.3	2.26	
Long Prairie	92	28	59.3	2.34	
Luverne†	92	30	64.2	1.23	
Lynd	96[c]	30[c]	62.8[c]	1.37	
Mapleplain	......	......	......	1.28	
Milaca	96	31	60.5	1.04	
Milan†	99	27	61.1	1.73	
Minneapolis *a*	92	36	62.1	0.81	
Minneapolis *b* [1]	95*	30	60.0	0.87	
Minnesota City†	......	......	......	0.88	
Montevideo	98	32	62.8	1.72	
Morris	97	32	60.0	1.79	
Mount Iron	88	29	55.1	2.78	
Newfolden	81	27	54.6	2.10	
New Richland *[1]	92	42	60.3	......	
New Ulm†	95	34	61.2	0.41	
Park Rapids†	91	27	55.9	1.60	
Pine River	91	31	58.5	2.34	
Pipestone	......	......	......	1.55	
Pleasant Mounds	93	35	62.4	0.67	
Pokegama Falls	90	28	55.8	2.10	
Redwing	......	......	......	0.48	
Reeds	......	......	......	0.70	
Rolling Green	92	36	62.2	0.90	
Roseau [1]	82	28	52.2	1.39	
St. Charles†	97	29	62.6	1.02	
St. Cloud	94	32	63.2	2.28	
St. Olaf	95	34	60.5	1.87	
St. Peter	91	34	62.4	1.39	
Sandy Lake Dam	90	30	57.4	2.23	
Shakopee	96	36	64.7	1.17	
Slayton	94	30	62.0	1.49	
Tower†	90	28	54.8	2.95	
Two Harbors	86	30	56.6	2.28	
Wabasha *[1]	102	37	63.3	0.72	
Willmar	93	32	59.8	0.66	
Willow River	100	29	58.8	1.99	
Winnebago City	93	34	62.6	0.63	
Worthington	90	35	62.5	1.31	
Zumbrota [1]	96*	27	63.8	......	
Mississippi.					
Aberdeen	100	45	75.7	3.65	
Agricultural College	93	54	74.4	6.95	
Austin†	95	49	75.2	5.73	
Batesville†	94	46	74.8	3.79	
Bay St. Louis	90	67	78.8	12.88	
Biloxi†	91	64	77.6	21.76	
Booneville	95	49	76.3	2.95	
Briers	89	62	76.1	6.19	
Canton†	97	51	77.0	6.50	
Columbus *a*	......	......	......	5.48	
Columbus *b*	103	51	80.1	4.72	
Corinth	94	51	75.5	1.74	
Crystal Springs†	92	55	75.8	6.16	
Edwards	96	58	78.2	7.42	
Fayette	93	59	77.6	9.26	
French Camps	95	42	73.2	4.10	
Greenville *a*	93	57	75.0	5.75	
Greenville *b*†	95	56	77.2	6.12	
Greenwood	94	56	77.1	6.95	
Hattiesburg†	94	63	78.2	2.45	
Hazlehurst	96	57	77.6	4.80	
Hernando	95	53	75.8	4.39	
Holly Springs†	94	59	75.8	3.59	
Jackson†	95	55	76.4	5.55	
Kosciusko	91	55	75.4	2.71	
Lake†	94	55	74.6	5.70	
Leakesville	99	59	79.2	8.54	
Logtown†	92	65	78.0	17.65	
Louisville†	94	50	73.2	6.09	
Macon†	97	52	77.3	6.35	
Magnolia†	92	61	76.4	8.36	
Meridian	95	58	76.5	5.07	
Natchez†	96	62	79.0	4.35	
Okolona†	96	......	......	2.18	
Palo Alto	95	54	77.3	4.80	
Mississippi—Cont'd.	°	°	°	*Ins.*	*Ins.*
Port Gibson†	97	55	77.1	8.22	
Rosedale [4]	94	51	76.0	......	
Thornton	......	......	......	6.00	
Tupelo†	......	......	......	3.19	
Walnut Grove	91	62	78.8	3.20	
Water Valley *†[1]	99	51	74.1	4.00	
Waynesboro	91	54	76.5	7.19	
Windham	95	59	77.6	5.75	
Woodville†	91	59	77.0	6.18	
Yazoo City†	100	52	77.6	7.92	
Missouri.					
Akron	......	......	......	6.93	
Appleton City	97	46	72.9	6.31	
Arthur *[3]	......	48	69.0	7.04	
Avalon	93	46	68.8	7.52	
Bethany	91	44	67.9	6.08	
Birchtree	93	43	70.6	5.18	
Bolckow	......	......	......	7.60	
Boonville†	......	......	......	7.76	
Brunswick	91	48	70.1	5.30	
Carrollton†	93	48	70.6	6.41	
Conception	90	43	67.5	5.18	
Cowgill *[5]	90	44	70.4	7.96	
Darksville	94	43	69.5	5.35	
Downing	......	......	......	7.09	
East Lynne *[3]	......	46	67.6	5.36	
Edgehill *[5]	92	46	70.5	4.91	
Eightmile *[1]	92	46	68.6	5.02	
Eldon	99	49[c]	72.2[c]	6.75	
Elmira	94	40	69.9	4.99	
Fairport	......	......	......	10.50	
Farmersville	......	......	......	6.57	
Fayette	96	47	71.8	5.74	
Fulton	......	......	......	6.35	
Gallatin *[1]	93	48	70.8	8.10	
Glasgow	96	47	71.9	5.53	
Gordonville *[3]	......	47	69.0	7.43	
Gorin	......	......	......	6.21	
Halfway	93	42	71.2	9.10	
Harrisonville†	96	44	71.2	5.49	
Hermann†	......	......	......	4.82	
Houston	93	41	71.4	5.87	
Houstonia	......	......	......	8.07	
Irena	......	......	......	6.36	
Ironton†	96	37	72.0	4.61	
Jefferson City†	101	46	72.6	6.79	
Kidder	91	44	68.6	7.30	
Lamar†	96	44	73.8	6.56	
Lamonte	......	......	......	8.86	
Lebanon	93	47	72.2	9.25	
Lexington	95	45	71.5	6.90	
Liberty	93	42	69.4	5.99	
Louisiana	97	44	72.0	4.66	
McCune *†[1]	97	51	71.5	7.95	
Marblehill	97	39	72.8	6.45	
Marshall†	96	44	71.0	6.36	
Maryville	95	44	67.8	6.61	
Mexico†	103	47	71.8	7.86	
Miami	......	......	......	6.58	
Mineralspring	89	42	69.2	6.91	
Montreal	95	42	71.1	7.21	
Mount Vernon	96	45	73.4	8.41	
Neosho	92	39	71.6	7.43	
Nevada	96	44	71.3	5.76	
New Haven	96	45	73.4	3.60	
New Madrid	99	38	76.9	7.12	
New Palestine	94	49	72.3	7.00	
Oakfield	97	45	73.4	4.83	
Olden†	95	43	71.3	6.22	
Oregon *a*	93	44	69.1	10.01	
Oregon *b*	94	45	70.0	9.33	
Osceola†	......	......	......	10.72	
Oto	......	......	......	6.60	
Palmyra *[5]	94	48	71.9	7.27	
Phillipsburg *†[1]	97	48	69.3	7.50	
Pickering *[3]	......	46	65.2	6.73	
Platte River	94	47	68.4	6.34	
Poplarbluff	96	47	74.0	10.20	
Potosi	......	......	......	6.46	
Princeton	96	44	70.4	8.33	
Rhineland	96	42	72.8	5.21	
Richmond	94	48	71.4	5.25	
Rolla	......	......	......	7.50	
St. Charles	95[b]	53[c]	73.8[b]	4.64	
St. Joseph	......	......	......	6.34	
Sarcoxie *[3]	95	44	68.8	7.54	
Sedalia	96	40	69.4	7.27	
Seymour	90	44	69.6	6.45	
Shelbina	......	......	......	7.30	
Sikeston	97	45	74.2	9.07	
Steffenville	95	46	70.6	5.73	
Stellada†	93	44	69.8	7.90	
Sublett	92	43	68.8	14.67	
Unionville	92	45	71.8	7.17	
Vichy	98	46	72.0	5.94	
Warrenton	97	47	72.3	5.12	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Wheatland				8.90	
Willow Springs	90	40	65.6	5.13	
Zeitonia	95	44	73.1	5.74	
Montana.					
Adel	80	21	50.1	0.70	1.0
Billings	87	28	58.4	0.55	
Bozeman †	88	29	54.0	0.93	
Butte	86	28	54.3	0.91	T.
Castle	83	20	48.8	1.82	4.0
Chinook †	87	29	54.1	0.68	
Corvallis				0.34	
Crow Agency	89	30	58.7	1.01	1.0
Darby				0.13	
Dupuyer	85	28	54.2		
Florence	89	32	56.0	1.77	
Fort Benton	91	35	58.9	1.32	
Fort Logan	85	24	53.0	0.40	
Glendive †	96	34	61.3	1.70	
Glenwood	86	26	52.6	0.86	
Greatfalls †	83	36	56.6	1.72	
Kalispell	85	32	55.7	0.55	
Kipp †	90	23	53.4	0.37	T.
Livingston †	87	27	57.1	0.61	
Manhattan †	88	22	51.4	0.40	
Martinsdale †	84	25	53.7	1.26	
Marysville †	82	28	52.4	0.97	1.5
Missoula	90	35	57.0	1.40	
Parrot	84	30	53.9	1.65	
Plains	82	34	57.1	0.30	
Poplar	94	30	57.2	2.45	
St. Ignatius Mission	81	31	54.2	0.58	
St. Pauls †	86	29	57.8	1.14	
Troy	89	29	56.7	1.56	
Utica	90	26	56.2	0.47	T.
Yale	87	22	53.8	0.27	
Nebraska.					
Agee *[1]	98	38	63.4	1.47	
Albion	95	38	62.1	1.28	
Alliance				T.	
Alma *[1]	94	32	61.8[c]	5.69	
Ansley †	99	32	62.0	1.64	T.
Arapaho *[1]	98	35	61.0	6.03	
Arborville *[1]	100	38	64.2	2.97	
Ashland *a* †	98	38	67.4	2.90	
Ashland *b* *[1]	100	46	67.2	2.91	
Ashton				2.61	T.
Auburn *†[1]	99	40	68.6	4.37	
Aurora				3.02	
Bartley				4.15	
Bassett				0.27	T.
Beatrice †	100	37	68.2	3.41	
Beaver City †	103	33	66.2	5.51	
Bellevue				3.78	
Benedict				2.21	
Benkelman				3.22	
Blair	97	42	66.8	2.08	
Bluehill				3.58	
Brokenbow				1.38	
Burchard				4.70	
Burwell				0.86	
Callaway †	92	30	56.0	1.50	
Camp Clarke	102	23	61.6	0.30	T.
Central City				2.07	
Cody				0.50	
Columbus †	93	39	65.5	2.41	
Creighton †	95	34	62.6	1.11	
Crete	96	39	68.1	2.25	
Culbertson				3.90	
Curtis *a*	99	34	64.6	3.70	
David City	93	39	65.0	2.20	
Dawson	98	42	69.5	7.59	
Eden				5.77	
Edgar *[1]	98	42	64.2	3.15	
Elba				2.40	
Ericson *†[1]	95	42	64.8	0.91	
Ewing †				0.72	
Fairbury †	102	37	67.4	3.72	
Fairfield	98			4.50	
Fairmont †	97	35	65.8	3.30	
Fort Robinson	94	30	62.0	0.76	
Franklin	104	34	67.3	4.12	
Fremont †	96	36	64.7	1.95	
Geneva †	97	38	64.5	3.35	
Genoa	97	40	65.6	2.02	
Gering				0.28[c]	
Gordon				1.40	
Gothenburg	95	31	60.7	3.01	T.
Grand Island *a*				3.33	
Greeley *[1]	96	40	64.5	1.80	
Haigler				3.20	
Hartington †	96	34	64.3	1.10	
Harvard	95	39	64.4	4.37	
Hastings *[1]	96	41	64.8	3.65	
Hay Springs	95	32	60.4	1.31	
Hebron †	99	37	67.4	2.47	
Hickman				2.50	
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Holdrege *b*				5.05	
Hooper *[1]	94	40	63.9	2.07	
Imperial †	101	31	65.4	4.02	1.5
Kennedy	99	31	60.4	0.71	
Kimball †	95	31	60.5	0.60	1.0
Kirkwood *[1]	98	40	63.8	0.49	
Lexington †	96	30	61.5	2.92	
Lincoln *b*	97	40	67.8	2.45	
Lincoln *d* †	98	40	69.0	2.21	
Lodgepole †	96			2.25	
Longpine				0.30	
Loup *b* *[1]	94	30	61.7	3.23	
Lynch *†[1]	100	31	61.3	0.67	
Lyons				1.68	
McCook				3.95	
McCool				2.79	
Madison	94	37	64.2	1.44	
Madrid *[5]	98	28	60.6	2.75	
Marquette				2.44	
Merriman				0.00	
Minden *a*	99	37	64.2	4.39	
Monroe				1.68	
Nebraska City *b*				3.55	
Nebraska City *c*	98	43	69.2	3.57	
Nemaha *[1]	98	40	68.0	5.08	
Nesbit	98	31	59.6	1.78	
Norfolk *b*	94	34	64.1	1.46	
Norman				4.54	
North Loup	98	33	64.6	1.78	
Oakdale †	97	34	63.8	0.93	
Odell *[5]	96	42	67.6	3.26	
O'Neill †	97	35	63.4	1.29	
Ord	100	32	63.0	2.75	
Osceola				1.91	
Ough †				3.80	
Palmer *b*	104	38	67.0	3.18	
Plattsmouth *b*				2.40	
Ravenna *a*	100	32	64.7	3.10	
Ravenna *b*				3.50	
Redcloud *a*				4.22	
Redcloud *b* *[1]	90	38	66.6	4.75	
Republican *[1]	100	40	63.5	5.40	
Rulo *[1]	98	50	70.8	8.93	
St. Libory	96	40	67.0	3.30	
St. Paul	98	38	65.6	2.96	
Salem *[1]	94	46	68.6	7.55	
Santee Agency †	101	34	69.4	0.82	
Schuyler				2.51	
Seneca *[1]	96	38	59.4	1.70	
Seward *[1]	96	45	66.6	2.21	
Springview	94	36	62.9	0.52	
Stanton				1.64	
State Farm	99	38	68.2	2.81	
Stockham				7.10	
Strang *[1]	94	43	66.9	2.51	
Stratton				4.48	
Superior *[5]	92	40	67.5	4.00	
Syracuse				2.90	
Tablerock	100	40	70.8	7.11	
Tecumseh *b* †	100	37	69.6	4.48	
Tekamah	97	35	65.8	2.62	
Thedford *[1]	92	38	60.2	1.10	
Turlington †	99	41	68.8	3.72	
Valentine †	96	35	62.2	0.64	
Valparaiso				2.55	
Wakefield	96	35	63.8	1.19	
Wauneta				4.49	
Weeping Water *[1]	94	43	63.5	2.66	
Westpoint †	95	38	66.2	1.30	
Whitman				T.	
Wilber *[1]	92	44	65.9	3.02	
Wilsonville *[1]	96	36	64.0	4.25	
Wisner				1.19	
Wymore *[1]	91	45	68.8	3.49	
York *[1]	100	46	65.5	2.16	
Nevada.					
Austin	84	35	60.5	0.30	
Battle Mountain *[1]	89	45	61.7	0.50	
Beowawe *[1]	94	40	64.2	0.15	
Blaine	85	24	55.3	0.36	
Bunkerville				0.00	
Candelaria	93	39	67.5	0.70	
Carlin *[1]	84	32	54.0	0.50	
Carson City	92	32	61.0	0.15	
Clover Valley				0.17	
Cranes Ranch				0.11	
Elko *[1]	85	30	52.2	0.45	
Elko (near)	81	18	50.5	0.12	
Ely	85	29	58.0	0.15	
Empire Ranch	88	30	57.7	0.06	
Fenelon *[1]	87	25	55.2	0.27	
Golconda *[1]	82	28	55.3	0.06	
Halleck *[1]	86	23	55.1	0.15	
Hawthorne *a* *[1]	88	48	69.0	0.00	
Hawthorne *b*	92	42	66.7	0.64	
Hot Springs				0.00	
Nevada—Cont'd.	°	°	°	*Ins.*	*Ins.*
Humboldt *[1]	92	45	62.2	0.10	
Lewers Ranch	91	30	62.0	0.18	T,
Los Vegas	89	52	67.8	0.00	
Lovelocks *[1]	90	40	63.5	0.40	
McGill	83	23	56.2	0.08	
Martins	90	30	60.6	0.00	
Mill City *[1]	94	35	67.1	0.30	
Monitor Mill	85	29	57.8	T.	
Osceola				T.	T.
Palisade *[1]	88	40	64.4	0.30	
Palmetto	91	31	61.0	0.28	
Panaca[h]	91	38	64.5	T.	
Reno *[1]	92	40	62.6	0.11	T.
Reno State University	89	32	61.0	0.31	0.5
Ruby Valley				0.11	
St. Clair	89	34	62.6	0.35	
San Antonio	88			0.36	
Silverpeak	96	42	69.8	T.	
Sodaville	97	40	67.7	0.74	
Tecoma *[1]	95	38	57.2	T.	
Toano *[1]	90	34	59.2	T.	T.
Tuscarora	82	28	57.2	0.21	T.
Tybo	90	32	62.8	0.05	
Verdi *[1]	92	35	61.5	0.19	1.0
Wadsworth *[1]	96	40	64.1	0.18	
Wells	86	19	55.0	0.20	
New Hampshire.					
Alstead *[6]	86	35	62.0	5.34	
Berlin Mills	85	30	57.3	5.38	
Bethlehem	85	31	58.9	5.12	
Brookline *[1]	94	32	65.9	2.30	
Claremont	87	34	61.2	2.42	
Concord	89	31	61.3	5.89	
Durham	89	38	62.8	3.57	
Hanover	89	34	61.2	4.53	
Keene	91	29	62.1	3.27	
Lancaster				4.48	
Littleton	86	32	59.5	4.57	T.
Nashua	92	36	64.2	1.81	
Newton	89	33	62.2	2.37	
North Conway	88	34	61.5	3.35	
Peterboro	89	30	61.2	2.99	
Plymouth	90	33	60.6	4.47	
Sanbornton †	87	32	60.4	4.35	
Stratford	87	31	60.0	6.27	
Warner				7.08	
New Jersey.					
Asbury Park	98	51	70.0	1.49	
Barnegat	94	53	70.8	1.52	
Bayonne	99	45	71.4	1.56	
Belvidere	98	39	67.5	1.61	
Bergen Point	95	49	70.0	2.18	
Beverly †	98	43	70.2	1.86	
Billingsport *[1]	94	53	69.2	2.33	
Boonton	95	41	67.7	2.00	
Bridgeton	99	45	71.6	2.14	
Camden	92	47	68.7	1.35	
Cape May C. H. †	93	48	69.8	2.12	
Charlotteburg	94	31	63.8	1.78	
Chester	97	42	65.8	2.17	
Clayton	98	43	69.7	2.24	
College Farm †	97	42	68.9	1.46	
Deckertown	92	37	65.2	2.26	
Dover	96	38	66.3	2.69	
Egg Harbor City	97	41	68.6	1.69	
Elizabeth †	100	44	69.6	3.14	
Englewood	96	36	67.1	0.89	
Flemington	99	41	68.5	2.36	
Franklin Furnace	92	38	64.6	1.43	
Freehold	91	42	67.3	1.43	
Friesburg	97	43	69.8	3.87	
Gillette	94	34	66.2	1.03	
Hammonton				2.35	
Hightstown	93	43	69.4	2.73	
Imlaystown	98	44	70.4	2.18	
Lambertville	96	41	68.7	1.50	
Lebanon				2.21	
Moorestown	97	44	70.0	1.66	
Newark *b* †	97	47	70.0	1.63	
New Brunswick *a*	99	43	70.8	1.53	
Newton	93	39	65.4	0.65	
Ocean City	94	47	68.2	2.09	
Oceanic	93	47	68.4	1.26	
Paterson	98	44	70.8	1.48	
Perth Amboy	96	45	68.6	1.53	
Plainfield	97	39	67.7	2.87	
Rancocas				2.03	
Rivervale	99	35	65.4	2.29	
Roseland	96	37	66.7	1.30	
Salem[h]	90	45	66.6	3.69	
Somerville	100	40	69.2	2.13	
South Orange	94	42	67.6	1.11	
Staffordville				2.93	
Toms River	98	38	68.0	3.21	
Trenton	96	48	71.4	1.35	
Tuckerton	96	43	69.4	2.05	

REV——5

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Jersey—Cont'd.	°	°	°	*Ins.*	*Ins.*
Vineland	100	43	70.2	2.11	
Woodbine	94[a]	43[a]	71.4[a]	2.46	
New Mexico.					
Albert	96	38	69.1	0.58	
Albuquerque†	88	42	67.2	0.28	
Alma	93	41	66.6	1.53	
Aztec†	90	31	63.6	T.	
Bernalillo†	90	42	67.6	T.	
Bluewater	87	27	59.3	0.00	
Buckmans	78	18	50.4	0.12	T.
Clayton	97	34	67.0	0.90	0.2
Deming*[1]	92	50	71.1	0.21	
East Lasvegas†	85	34	58.8	1.29	
Eddy	98	38	68.8	0.60	
Engle†	90	41	65.1	0.70	
Espanola	90	31	63.3	0.22	
Folsom	89	31	58.6	......	......
Fort Bayard	90	45	66.5	1.05	
Fort Union	88	33	58.7	1.35	
Fort Wingate	90	29	65.0	0.21	
Galisteo	86	33	63.4	0.30	
Gallinas Spring†	92	35	64.8	0.70	
Gila	94	44	71.0	1.16	
Hillsboro	103	......	......	0.34	
Laluz	89	46	70.2	1.53	
Las Vegas Hotsprings	87	31	60.6	1.29	T.
Lordsburg*[1]	90	56	72.2	0.16	
Lower Penasco	87	35	63.9	1.15	
Mesilla Park	95	39	68.3	1.74	
Monero	85	19	54.4	0.30	
Puerto de Luna	94[1]	38[1]	68.6[1]	1.56	
Raton	89	27	58.6	0.11	1.2
Rincon†	93	43	70.2	0.90	
Roswell†	97	35	67.8	0.69	
San Marcial	89	......	......	0.65	
Springer[1]	90	24	58.7	0.20	
White Oaks†	86	34	61.1	1.24	
Winsors Ranch	79	......	......	1.41	
New York.					
Adams	......	......	......	2.92	
Addison	93	38	63.4	1.31	
Akron	......	......	......	3.51	
Alden	93	33	64.5	3.62	
Alfred	88	32	63.7	1.13	
Angelica†	88	36	61.9	1.93	
Appleton	94	39	64.4	3.78	
Arcade	87	32	62.3	4.77	
Atlanta	......	......	......	1.96	
Auburn	93	39	66.6	5.30	
Avon	95	35	64.8	3.12	
Baldwinsville	92	38	64.2	3.35	
Bedford	90	36	64.5	1.55	
Big Sandy*[10]	87	34	63.9	......	
Bolivar	89	31	59.8	1.27	
Bouckville	87	37	61.5	3.74	
Boyds Corners	......	......	......	2.17	
Brentwood	94	36	67.6	2.20	
Canajoharie	91	42	66.0	1.74	
Canton	90	32	61.0	6.63	
Carmel	93	43	67.4	2.38	
Carvers Falls	91	32	62.2	2.77	
Catskill	91	40	65.8	3.77	
Cedarhill	93	37	66.3	1.29	
Charlotte*[10]	90	42	64.7	......	
Chenango Forks	......	......	......	2.40	
Cherry Creek	......	......	......	2.17	
Cooperstown†	87	35	61.0	4.20	
Cortland	91	32	63.7	3.46	
Dekalb Junction	......	......	......	6.06	
Dryden	91[c]	33[c]	62.5[c]	2.95	
Elizabethtown	94	28	60.1	1.65	
Elmira	97	38	66.0	1.78	
Fayetteville	......	......	......	4.61	
Fleming	93	43	66.8	3.55	
Franklinville	89	32	62.0	2.51	
Fulton	......	......	......	4.02	
Glens Falls	89	40	63.0	3.42	
Gloversville	92	34	62.4	3.16	
Greenwich	88	35	63.0	5.11	
Haskinsville	......	......	......	1.77	
Hemlock Lake	90	42	65.6	2.43	
Honeymead Brook	89	38	61.4	5.61	
Humphrey†	87	33	62.6	3.22	
Ithaca	91	37	64.6	3.15	
Jamestown	88	36	63.4	2.15	
Keene Valley[1]	84	31	60.1	3.56	
Kings Station	......	......	......	3.22	
Lake George	88	38	62.4	3.16	
Liberty	86	37	61.4	2.85	
Little Falls	90	35	62.7	3.53	
Lockport	90	40	63.6	4.36	
Lowville	89	28	60.8	2.92	
Lyndonville	......	......	......	3.36	
Lyons	92	42	65.7	3.09	
Middletown	92	39	64.5	1.74	
Milford	......	......	......	3.23	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mount Morris	95	30	65.7	1.55	
Newark Valley	......	......	......	2.33	
New Lisbon	88	29	59.6	4.95	
Niagara Falls	......	......	......	6.41	
North Hammond†	96	34	64.6	4.41	
North Lake	86	32	58.4	5.35	
Number Four†	84	27	58.3	5.17	
Nunda	96	34	65.0	2.05	
Ogdensburg	86	37	60.6	3.06	
Oneonta	88	33	60.2	4.19	
Oxford	91	34	62.4	4.99	
Palermo	92	32	63.2	......	
Penn Yan	95	37	66.8	1.38	
Perry City	91	32	62.2	2.12	
Phenix	......	......	......	4.20	
Pine City	......	......	......	1.85	
Plattsburg Barracks†	94	36	61.4	3.37	
Port Jervis	91	38	65.5	2.14	
Poughkeepsie	94	35	65.0	2.21	
Primrose	95	42	65.9	1.01	
Ridgeway	91	41	65.2	3.80	
Rome	91	34	60.4	3.95	
Romulus	94	40	66.1	2.03	
Rose	......	......	......	3.33	
St. Johnsville	92	33	63.4	3.80	
Saranac Lake	88	29	59.1	4.05	
Saratogo Springs	92	36	62.9	3.05	
Scottsville	......	......	......	4.00	
Setauket†	90	48	67.3	1.85	
Sherwood	......	......	......	3.45	
Skaneateles	......	......	......	5.53	
South Canisteo	90	31	61.6	2.28	
Southeast Reservoir	......	......	......	2.23	
South Kortright†	88	28	59.8	2.98	
Straits Corners	93	33	61.7	2.57	
Ticonderoga	91	41	64.1	2.54	
Wappingers Falls	91	39	66.6	2.48	
Warwick	......	......	......	1.11	
Watertown	91	31	63.8	3.68	
Waverly†	95	33	63.0	1.87	
Wedgwood	94	37	65.3	1.86	
West Berne	90	38	63.2	2.18	
Westfield	90	35	65.6	2.46	
Westpoint†	96	46	68.8	1.37	
Willetspoint	98	48	69.1	1.40	
North Carolina.					
Abshers	91	47	71.6	8.32	
Asheville	......	......	......	6.05	
Beaufort†	90	60	77.0	0.90	
Biltmore†	87	49	68.6	6.09	
Bryson City†	......	......	......	9.15	
Chapel Hill	91	49	73.5	4.74	
Edenton	90	53	73.8	3.36	
Experimental Farm	90	51	73.2	3.67	
Fairbluff†	......	......	......	1.64	
Fayetteville†	93	52	74.2	2.43	
Flatrock	85	42	66.0	9.67	
Goldsboro	94	52	74.1	2.07	
Greensboro†	89	52	72.0	2.30	
Henderson†	90	46	75.0	1.72	
Hendersonville	87	43	67.8	7.81	
Horse Cove	85	51	67.6	11.16	
Lenoir*†[1]	83	50	69.8	8.00	
Linville†	77	41	60.9	9.59	
Littleton†	91	45	72.0	2.50	
Louisburg†	90	51	72.7	4.31	
Lumberton†	92	56	75.4	4.36	
Mana	......	......	......	5.16	
Marion	85	46	66.5	9.62	
Mocksville	90	49	72.5	3.93	
Moncure†	89	54	72.9	4.09	
Monroe†	91	46	72.8	4.72	
Morganton	92	54	73.2	6.41	
Mountairy	88	45	69.2	8.09	
Mount Pleasant	92	51	73.4	1.89	
Murphy†	......	......	......	7.37	
Newbern	97	54	76.6	3.87	
Oakridge†	89	48	71.2	5.08	
Pantego	......	......	......	3.87	
Patterson	85	46	67.9	......	
Pittsboro†	92	49	72.9	4.19	
Rockingham†	94	54	74.4	2.33	
Roxboro†	91[c]	42[c]	70.0[c]	2.38	
Salem†	90	50	72.2	4.28	
Salisbury†	94	50	73.4	0.94	
Saxon†	92	48	72.5	5.92	
Selma	94	50	73.8	3.20	
Settle	90	49	70.1	2.70	
Sloan†	92	54	75.5	1.42	
Soapstone Mount†	90	45	70.7	3.83	
Southern Pines *a*†	93	52	75.4	2.88	
Southern Pines *b*	......	51	......	2.30	
Southport†	91	57	76.4	1.70	
Springhope*[1]	89	52	70.8	2.50	
Tarboro	95	50	75.2	1.84	
Washwoods	......	......	......	3.94	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Waynesville†	84	43	65.4	3.66	
Weldon†	93	51	74.5	2.42	
North Dakota.					
Amenia	90	25	58.0	0.77	
Aneta	96	25	55.8	1.90	
Ashley†[a]	93	20	58.6	0.58	
Berlin[1]	91	26[a]	56.6	0.59	
Bottineau	88	28	53.6	1.45	
Buxton	85	28	56.4	1.21	
Churchs Ferry	89	24	56.3	3.40	
Coal Harbor	92	28	57.3	1.94	
Devils Lake	86	29	56.6	1.52	
Dickinson	96	24	56.8	0.79	
Ellendale	95	27	57.6	0.15	
Fargo†	93	23	57.8	1.23	
Forman†	93	24	58.5	1.59	
Fort Berthold	94	24	60.2	2.24	
Fort Yates†	97	......	......	0.67	
Fullerton	92	23	56.4	0.64	
Glenullin	91	23	54.5	......	
Goetz	93	23	56.2	0.63	
Grafton	88	30	56.4	1.89	
Hamilton	85	27	54.4	3.12	
Jamestown†	93	25	55.6	0.74	
Kelso	88	28	57.8	1.05	
Langdon	84	25	52.4	1.42	
Larimore†	90	29	55.6	1.58	
Lisbon	91	28	58.8	1.00	
McKinney	95	23	54.4	0.68	
Mayville	86	30	60.0	0.90	
Medora†	98	23	58.2	0.82	
Melville	92	25	57.4	0.67	
Milton†	......	26	......	2.75	
Minnewaukon	91	25	55.8	1.13	
Minot	88	28	60.4	0.50	
Minto†	89	27	56.1	2.02	
Napoleon†	93	23	57.1	0.42	
New England City	94	21	57.5	0.75	
Oakdale†[j]	80	28	55.8	1.50	
Pembina	88	27	56.4	2.57	
Portal	93	25	53.9	1.26	
Power†	92	23	58.4	0.72	
Sheyenne	90	24	56.9	0.35	
Steele	92	26	57.3	0.30	
Towner†	92	24	56.7	1.05	
University	85	29	56.8	2.26	
Valley City†	88	24	57.6	0.91	
Wahpeton†	98	27	60.2	1.54	
Washburn	98	19	56.4	1.46	
Willow City	91[c]	25[c]	54.4[c]	1.50	
Woodbridge†	87	28	53.0	1.14	
Ohio.					
Akron	93	42	67.0	3.56	
Annapolis[b]	100	36	68.9	3.00	
Ashtabula	91	40	66.6	2.44	
Atwater	......	......	......	2.26	
Bangorville	95	40	67.5	3.97	
Bellefontaine	93	43	69.1	3.03	
Bement	......	......	......	7.31	
Benton Ridge	94	38	67.8	2.75	
Bethany	101	45	72.5	3.81	
Bigprairie	93	40	66.8	2.31	
Binola	......	......	......	2.56	
Bloomingburg	92	41	70.2	2.80	
Bowling Green	96	36	67.0	2.84	
Bucyrus	100	44	67.8	1.55	
Cambridge	92	35	65.5	1.72	
Camp Dennison	96	44	71.9	2.91	
Canal Dover	94	36	66.9	1.57	
Canton†	91	42	67.2	2.07	
Carrollton	95	37	67.4	2.22	
Cedarville	......	......	......	2.82	
Celina	96	34	68.2	2.22	
Chillicothe	94	45	69.2	2.06	
Circleville	93	43	69.6	1.68	
Clarksville	94	43	70.6	2.56	
Cleveland *a*	90	44	66.8	3.99	
Cleveland *b*	93	45	67.6	2.93	
Clifton	97	35	70.0	3.23	
Coalton	95	40	71.0	2.39	
Dayton *a*	97	38	70.6	4.13	
Dayton *b*†	......	......	......	3.09	
Defiance	95	38	67.1	4.92	
Delaware	92	42	69.4	1.70	
Demos	92	42	66.8	2.33	
Elyria	96	41	67.8	4.55	
Findlay	99	38	68.9	3.90	
Frankfort	92	39	68.4	2.36	
Garrettsville†	92	35	64.6	2.00	
Granville	95	35	67.5	1.51	
Gratiot	91	38	67.9	1.65	
Greenfield	93	47	70.0	2.00	
Greenhill	92	35	65.3	2.35	
Greenville	89	41	67.4	2.78	
Hackney	93	39	69.4	1.94	
Hanging Rock	95	47	71.8	2.29	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. (Fahrenheit.) Minimum.	Temperature. (Fahrenheit.) Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hedges	96	36	66.4	1.80	
Hillhouse	92	36	64.9	2.78	
Hillsboro †	99	39	71.0	2.97	
Hiram	90	42	66.1	2.53	
Hudson	93	37	65.7	2.20	
Jacksonboro	97	45	72.0	3.75	
Kenton	97	40	69.4	2.12	
Killbuck	92	39	66.6	3.26	
Lancaster	91	41	68.2	1.99	
Leipsic	98	47	68.2	4.21	
Levering	92	34	64.8	2.96	
Logan	99	38	70.4	2.27	
Lordstown	92	35	65.5	1.91	
McArthur	94	36	68.2	2.69	
McConnelsville †	97	39	68.8	2.39	
Mansfield †	......	......	......	3.48	
Marietta *b*	91	44	69.4	3.69	
Marion	95	39	69.1	1.24	
Medina	95	39	67.4	2.97	
Milfordton	95	35	66.4	1.58	
Milligan	97	34	67.8	1.67	
Millport	92	36	66.6	1.35	
Montpelier	94	40	65.4	3.46	
Napoleon	95	39	64.8	3.96	
Neapolis	......	......	......	4.27	
New Alexandria	87	43	66.8	2.55	
New Berlin	93	40	66.8	2.45	
New Bremen	......	......	......	0.83	
New Holland	95	40	69.8	2.70	
New Paris	92	44	69.8	3.19	
New Waterford	93	38	66.0	1.95	
North Lewisburg	98	35	69.0	4.55	
North Royalton	97	41	68.0	2.82	
Norwalk	95	40	67.2	3.13	
Oberlin	95	41	68.0	3.27	
Ohio State University	93	36	68.4	1.36	
Orangeville	91	34	63.8	3.10	
Ottawa	94	45	68.2	3.33	
Pataskala †	95	35	68.0	1.18	
Perry	......	......	......	3.77	
Philo	97	40	68.8	1.61	
Plattsburg	93	40	69.0	2.46	
Pomeroy	96	41	72.5	1.14	
Portsmouth *a* †	......	......	......	1.97	
Portsmouth *b*	91	45	70.3	1.97	
Richwood	100	40	72.2	1.41	
Ridgeville Corners	97	40	66.2	3.39	
Ripley	90	45	70.2	2.95	
Rittman	92	35	63.7	2.88	
Rockyridge	96	45	69.4	3.85	
Rosewood	93	40	67.9	3.46	
Seaman	102	33	69.6	1.89	
Shenandoah	97	39	66.2	3.62	
Sidney *b*	97	39	63.8	2.82	
Sinking Spring †	93	45	69.6	3.98	
Somerset †	95	48	71.5	1.16	
Springboro	......	......	......	2.65	
Strongsville	......	......	......	2.72	
Sylvania	94	37	63.2	2.29	
Thurman	94	45	70.6	1.65	
Tiffin †	92	42	67.6	4.89	
Upper Sandusky	101	37	69.2	3.64	
Urbana	90	38	68.0	3.83	
Vanceburg	92	45	70.0	2.40	
Vanwert	96	39	69.0	4.04	
Vermillion	92	42	66.7	3.66	
Vickery	96	40	68.0	2.99	
Walnut	......	......	......	1.84	
Warren	94	36	65.5	1.77	
Warsaw	98	34	68.0	1.60	
Wauseon	96	38	67.2	3.22	
Waverly	96	41	71.4	2.44	
Waynesville	94	39	69.0	2.75	
Wellington	94	40	67.2	2.29	
Westerville	89	39	67.5	1.56	
Willoughby	......	......	......	2.48	
Wooster *b* †	90	38	66.2	2.15	
Youngstown	94	40	66.4	1.95	
Zanesville †	......	......	......	1.80	
Oklahoma.					
Anadarko †	106	38	75.1	0.92	
Arapaho †	102	35	71.8	1.97	
Burnett †	98	45	72.7	1.74	
Clifton †	101	42	74.2	0.78	
Edmond	......	......	......	1.85	
Fort Reno †	100	40	73.1	2.57	
Fort Sill	103	42	73.2	2.07	
Guthrie	98	46	74.3	2.92	
Hennessey	......	......	......	2.23	
Hopeton	99	39	72.2	1.03	
Jefferson *	104	43	72.6	1.27	
Kingfisher	102	42	74.4	2.14	
Mangum †	105	40	73.0	1.45	
Newkirk	100	46	74.3	1.51	
Norman	......	......	......	1.22	
Pawhuska	96	47	73.4	4.63	

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. (Fahrenheit.) Minimum.	Temperature. (Fahrenheit.) Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
Oklahoma—Cont'd.	°	°	°	*Ins.*	*Ins.*
Prudence †	102	39	70.4	1.66	
Putnam	102	35	70.7	1.04	
Sac and Fox Agency	100	42	74.8	1.65	
Stillwater †	97	46	74.6	2.72	
Waukomis	102	41	74.4	1.13	
Winnview	......	......	......	1.13	
Oregon.					
Albany *a*	92	42	60.8	3.24	
Albany *b*	......	......	......	3.05	
Arlington	90	44	65.1	0.16	
Ashland *b*	99	35	62.0	0.39	
Aurora *[1]	92	45	61.4	3.54	
Aurora (near)	90	41	60.4	5.05	
Bandon	71	40	57.6	2.14	
Bay City †	89	42	58.4	7.37	
Beulah	93	21	57.6	0.20	
Brownsville *[1]	96	47	62.6	2.37	
Burns	92	13	54.6	T.	
Burns (near) [g]	93	25	59.6	T.	
Cascade Locks	86	44	62.5	6.78	
Comstock *[1]	96	44	60.0	1.73	
Coquille River	......	......	......	2.02	
Corvallis	94	38	61.5	3.15	
Dayville †	95	28	60.6	0.16	
Ella	......	......	......	0.50	
Fairview	90	42	61.0	1.54	
Falls City	90	42	60.3	5.06	
Gardiner	82	43	59.8	3.80	
Glenora	95	42	60.2	8.94	
Government Camp	88	29	53.2	6.89	12.0
Grants Pass *a* †	100	37	62.4	0.57	
Happy Valley	91	22	55.0	0.50	
Heppner	92	36	59.5	0.36	
Hood River (near)	87	43	60.6	2.74	
Jacksonville	96	38	62.4	0.45	
Joseph	86	26	54.4	0.58	
Junction City *[1]	96	48	62.3	1.49	
Klamath Falls	93	30	60.4	1.82	
Lafayette *[1]	94	46	60.3	3.80	
Lagrande	95	35	59.9	0.92	
Lakeview †	89	18	58.4	T.	0.2
Langlois	83	42	61.4	3.93	
Lonerock	92	31	57.3	0.19	
McMinnville	93	38	61.4	4.63	
Merlin *[1]	104	38	63.8	0.41	
Monmouth *a* *[1]	98	44	62.1	2.43	
Monmouth *b*	93	39	61.8	3.35	
Monroe	91	43	63.0	2.54	
Moro	88	39	59.2	0.38	
Mount Angel †	94	44	62.7	3.73	
Nehalem	......	......	......	7.82	
Newberg	91	41	61.6	5.18	
Newbridge [g]	87	28	52.9	0.36	
Newport	77	43	56.6	3.98	
Pendleton	97	34	62.2	0.55	
Placer	......	......	......	1.15	
Prineville [1]	98	21	60.6	0.03	
Riddles *[1]	98	40	61.5	0.70	
Riverside	99	......		0.21	
Salem *b* †	91	40	61.4	1.13	
Sheridan *[1]	96	45	64.1	0.90	
Silver Lake	93	19	54.6	0.20	
Silverton *[1]	94	48	63.1	3.03	
Siskiyou *[1]	92	40	67.6	0.20	
Sparta	86	28	58.4	1.20	
Springfield *[1]	93	45	60.8	1.82	
Stafford	93	44	62.8	5.80	
The Dalles †	91	42	63.6	0.85	
Toledo	86	44	62.1	5.50	
Umatilla	......	......	......	0.11	
Vale	92	19	58.8	0.15	
Vernonia	103	35	61.6	4.94	
West Fork *[1]	96	44	61.1	1.16	
Weston	93	37	60.6	0.75	
Williams	95	33	59.2	0.80	
Pennsylvania.					
Altoona	93	38	65.1	0.76	
Aqueduct	100	40	69.2	1.11	
Athens	97	36	64.2	1.64	
Beaver Dam	......	......	......	1.45	
Bethlehem	......	......	......	0.90	
Brookville †	......	......	......	1.46	
Browers Lock	......	......	......	1.82	
Cameron	......	......	......	1.23	
Carlisle	98	43	68.4	1.22	
Cassandra	87	38	62.3	1.61	
Cedarrun	......	......	......	2.25	
Centerhall †	92	40	64.2	1.26	
Chambersburg †	94	38	66.2	1.19	
Coatesville	98	40	69.2	2.73	
Confluence †	94	38	65.8	2.20	
Coopersburg	94	42	69.0	0.91	
Davis Island Dam †	......	......	......	1.00	
Derry Station	92	39	67.4	1.43	
Doylestown	......	......	......	1.95	
Drifton	87	40	61.8	0.80	

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. (Fahrenheit.) Minimum.	Temperature. (Fahrenheit.) Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Driftwood	......	......	......	0.85	
Duncannon	......	......	......	2.25	
Dushore	92	......	......	1.89	
Dyberry	92	31	61.6	2.93	
East Bloomsburg	......	......	......	0.13	
East Mauch Chunk	96	37	66.0	1.44	
Easton	93	43	67.0	1.18	
Ellwood Junction †	......	......	......	1.07	
Emporium	90	40	63.8	1.89	
Everett	91	38	64.6	0.89	
Farrandsville	......	......	......	0.79	
Forks of Neshaminy *[1]	93	52	70.6	1.90	
Franklin	93	35	65.8	2.10	
Frederick	......	......	......	2.62	
Freeport †	......	......	......	1.62	
Girardville	......	......	......	1.14	
Grampian	90	36	64.6	1.54	
Greensboro †	95	40	67.2	1.50	
Greenville	85	40	63.3	1.76	
Hamburg	99	30	69.4	1.14	
Hawley	100	36	65.6	3.17	
Hews Island Dam	......	......	......	1.02	
Hollidaysburg [d]	92	35	63.7	0.73	
Huntingdon *a* †	98	35	66.3	0.95	
Huntingdon *b*	......	......	......	0.67	
Indiana	94	41	67.5	1.70	
Irwin	......	......	......	1.41	
Johnstown †	94	41	67.0	2.04	
Karthaus	......	......	......	0.21	
Keating	......	......	......	0.96	
Kennett Square	95	44	68.8	3.95	
Lansdale	......	......	......	1.81	
Lawrenceville	95	......	......	1.98	
Lebanon	95	40	68.1	0.99	
Leroy †	90	38	64.0	0.81	
Lewisburg	96	38	66.5	0.93	
Lock Haven *a* †	100	40	67.7	0.38	
Lock Haven *b*	......	......	......	0.36	
Lock No. 4 †	......	......	......	2.99	
Lycippus	90	40	67.6	2.03	
Mifflin	......	......	......	0.90	
Oil City †	......	......	......	2.11	
Ottsville	......	......	......	2.09	
Parker †	......	......	......	1.23	
Philadelphia *b*	96	51	71.2	1.98	
Point Pleasant	......	......	......	1.28	
Pottstown	95	47	69.8	1.85	
Quakertown	97	38	67.6	2.70	
Reading [2]	......	......	67.2	1.08	
Renovo *a*	......	......	......	0.48	
Renovo *b*	93	38	65.1	0.59	
Ridgway †	......	......	......	1.16	
Saegerstown	93	30	64.5	3.3	
Scranton	95	35	65.6	2.47	
Seisholtzville	......	......	......	1.83	
Selinsgrove	96	39	66.8	0.91	
Shawmont	......	......	......	1.66	
Shinglehouse	92	32	61.0	1.94	
Sinnamahoning	......	......	......	0.32	
Smethport	91	34	61.8	2.40	
Smiths Corners	......	......	......	2.03	
Somerset	92	34	62.0	1.87	
South Bethlehem	96	44	68.2	......	
South Eaton	91	39	64.1	1.90	
State College	93	39	64.8	0.93	
Sunbury	......	......	......	0.65	
Swarthmore *	93	46	68.0	1.95	
Towanda	93	37	63.8	1.98	
Trout Run	......	......	......	1.59	
Uniontown	91	41	67.2	1.54	
Warren †	88	37	63.4	2.63	
Wellsboro †	93	34	63.8	2.94	
West Chester	94	47	69.1	1.74	
West Newton †	......	......	......	2.84	
White Haven	94	36	63.0	1.01	
Wilkesbarre †	92	37	64.9	3.44	
Williamsport	94	40	66.2	0.81	
York †	94	40	67.8	1.82	
Rhode Island.					
Bristol	89	46	65.6	1.58	
Kingston	92	38	64.4	2.11	
Lonsdale	......	......	......	2.49	
Pawtucket	95	43	67.8	2.41	
Providence *a*	94	44	68.0	2.26	
Providence *c*	94	41	66.4	2.43	
South Carolina.					
Allendale	92	55	75.4	9.02	
Anderson †	......	......	......	*5.50	
Batesburg †	95	52	75.6	1.12	
Blackville †	95	53	76.3	4.68	
Camden †	......	......	......	3.31	
Central	89	53	71.8	6.50	
Cheraw *a* †	96	54	75.4	1.93	
Cheraw *b* †	......	......	......	2.94	
Clemson College *a*	93	56	72.6	5.52	
Conway †	......	......	......	3.96	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Darlington	......	......	......	4.36	
Edisto†	......	......	......	2.24	
Effingham†	......	......	......	4.21	
Florence	93	55	76.0	5.21	
Gaffney†	......	......	......	6.03	
Georgetown†	92	60	78.6	......	
Gillisonville	93	57	76.9	2.70	
Greenville†	90	52	72.1	6.31	
Greenwood	91	51	74.2	4.44	
Holland	88	52	72.2	5.95	
Kingstree *a*†	96	55	76.2	3.81	
Kingstree *b*	......	......	......	3.81	
Little Mountain	94	49	74.2	3.31	
Longshore†	......	52	......	2.57	
Mount Carmel†	......	......	......	10.64	
Pinopolis *[1]	87	62	75.2	3.45	
Port Royal†	88	63	77.8	2.63	
St. Georges†	92	58	76.6	3.00	
St. Matthews†	94	57	75.8	3.20	
St. Stephens†	......	......	......	3.47	
Santuck†	90	51	73.4	2.60	
Shaws Fork	94	48	73.6	3.01	
Smiths Mills†	......	......	......	5.76	
Society Hill†	90	56	74.6	3.17	
Spartanburg	89	51	73.0	5.44	
Statesburg†	92	57	76.1	2.58	
Summerville	89	58	75.3	3.85	
Trenton	93	56	76.1	5.58	
Trial	91	55	74.6	2.99	
Walhalla	90	54	71.1	5.38	
Walling	91	50	73.6	2.27	
Winnsboro	90	54	73.4	1.33	
Yemassee†	93	59	77.7	7.93	
Yorkville	91	53	74.1	4.64	
South Dakota.					
Aberdeen†	101	26	60.2	0.80	
Armour	99[c]	35[f]	63.4[f]	0.30	
Ashcroft†	100	23	59.0	1.38	
Bowdle	100	19	57.6	0.22	
Brookings†	96	27	60.5	1.31	
Canton	94	33	63.2	0.63	
Centerville	......	......	......	0.71	
Chamberlain†	103	34	65.8	0.61	
Chandler	105	33	64.9	0.31	
Clark	......	......	......	1.34	
Desmet	97	28	60.2	1.91	
Doland	......	27	......	1.52	
Farmingdale	......	......	......	1.34	
Flandreau	99	29	63.2	1.15	
Forestburg†	100	24	61.8	1.15	
Fort Meade†	96	28	59.8	1.80	
Gannvalley	101	30	62.7	0.50	
Gary	98	36	61.4	1.42	
Goudyville	101	22	59.3	0.59	
Harney	96	23	55.7	1.35	4.0
Hotch City†	102	31	63.0	0.18	
Hot Springs	90	31	57.7	1.10	
Howard†	100	29	63.0	1.10	
Interior	110	28	63.6	0.70	
Ipswich	98	24	57.8	0.42	
Kimball†	100	32	64.0	0.70	
Mellette†	102	25	62.0	1.15	
Menno†	100	31	64.9	0.15	
Millbank	94	32	62.0	0.95	
Mitchell†	99	29	63.0	0.61	
Montrose	97	32	63.0	......	
Nowlin	101	30	62.7	0.04	
Parker *	92	26	61.0	0.34	
Plankinton†	100	32	61.7	0.56	
Redfield	101	24	61.1	1.43	
Rochford	92	......	......	1.72	12.0
Rosebud	100	33	61.0	0.35	
Shiloh	95	28	59.0	0.11	
Silver City	......	......	......	1.54	13.0
Sioux Falls†	98	26	62.4	0.81	
Spearfish†	92	30	59.4	0.60	
Tyndall†	95	30	62.5	0.40	
Watertown	94	25	59.8	1.53	
Waubay	103	32	64.0	0.12	
Wentworth†	98	30	62.3	1.36	
Wessington Springs	100	35	60.8	1.42	
Whiteswan	99	38	65.2	0.26	
Wolsey	......	......	......	1.29	
Tennessee.					
Andersonville	88	49	70.8	7.08	
Arlington	96	47	75.8	3.97	
Ashwood	92	47	74.5	3.83	
Benton (near)†	94	52	73.4	5.44	
Bluff City†	......	......	......	3.04	
Bolivar†	97	46	73.7	3.90	
Bristol†	87	45	68.6	5.59	
Brownsville	98	50	76.6	4.10	
Byrdstown	90	47	72.5	3.75	
Carthage†	95	52	76.0	1.75	
Clarksville	92	49	74.6	4.02	
Clinton†	......	......	......	6.91	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
Covington	97	52	75.0	3.86	
Decatur†	90	50	72.4	7.01	
Dover	100	47	75.2	4.11	
Dyersburg	96	56	75.2	4.35	
Elizabethton†	93	45	71.5	4.27	
Elk Valley	92	48	71.8	4.86	
Erasmus	89	38	68.8	3.48	
Florence†	91	49	73.9	3.76	
Franklin	91	47	73.4	3.88	
Grace *[5]	92	44	73.0	4.02	
Greeneville†	86	47	69.6	3.56	
Harriman	89	49	71.8	6.00	
Hohenwald†	94	49	74.3	2.36	
Jackson	94	48	74.4	4.45	
Johnsonville	98	44	75.0	2.35	
Jonesboro *[1]	85	48	68.3	4.05	
Kingston†	......	......	......	8.31	
Lafayette *[5]	94	50	73.4	4.05	
Lewisburg	......	......	......	3.93	
Liberty†	92	50	74.2	1.78	
Lynnville†	92	50	73.8	3.93	
McKenzie†	93	51	75.2	4.50	
McMinnville†	92	44	72.6	3.85	
Madison	96	42	74.0	5.90	
Maryville *[5]	88	52	71.6	6.39	
Milan	98	50	76.2	3.64	
Nashville (near)	96	53	75.6	4.82	
Newport†	94	49	71.4	3.22	
Nunnelly	94	43	73.6	2.70	
Oak Hill	91	46	72.6	3.65	
Palmetto†	93	47	74.4	4.61	
Pope	98	43	75.0	2.53	
Rogersville†	87	47	70.3	1.76	
Rugby	87	43	69.6	3.67	
Savannah	98	48	75.7	3.31	
Sewanee†	87	52	69.3	6.00	
Silverlake	83	41	65.2	4.40	
Springdale	90	49	71.4	3.39	
Springfield	97	43	74.6	3.35	
Sylvia	95	45	74.0	3.14	
Tazewell	......	......	......	2.92	
Tellico Plains†	93	53	73.0	4.44	
Tracy City	85	49	68.7	4.77	
Trenton	94	48	73.8	5.04	
Tullahoma†	90	48	72.4	3.30	
Union City	98	49	74.8	5.00	
Waynesboro	95	43	73.2	2.94	
Wildersville	90	49	74.2	3.27	
Yukon	90	51	73.4	3.37	
Texas.					
Alvin	......	......	......	3.85	
Anna	......	......	......	1.20	
Anson	......	......	......	3.00	
Arthur City†	......	......	......	4.04	
Austin *a*	94	55	77.6	0.50	
Austin *b* *[5]	94	54	76.6	......	
Ballinger†	100	48	71.8	4.97	
Beaumont	100	62	78.1	3.10	
Beeville†	101	62	82.2	0.94	
Blanco†	......	......	......	2.50	
Boerne *[1]	95	58	76.1	2.10	
Brazoria†	91	66	78.8	4.43	
Brenham†	99	59	80.0	1.64	
Brighton	100	60	77.9	3.00	
Brownwood	......	......	......	0.70	
Burnet *[1]	96	55	75.9	1.08	
Coleman	99	49	75.2	1.80	
College Station [2]	93	......	78.4	0.92	
Colorado	......	......	......	4.08	
Columbia†	91	64	78.8	2.68	
Conroe	98	56	78.8	1.93	
Corsicana *b*†	100	55	78.4	1.53	
Cuero†	95	64	79.8	2.78	
Dallas†	98	51	76.9	0.90	
Danevang†	97	63	79.8	2.92	
Dublin†	98	53	75.0	1.12	
Duval	......	......	......	T.	
Emory	94	50	76.4	1.60	
Estelle†	99	51	77.4	1.25	
Forestburg	104	48	76.7	0.88	
Fort McIntosh	102	62	84.2	1.25	
Fort Ringgold†	99	62	81.4	1.33	
Fort Stockton	......	......	......	0.58	
Fredericksburg *†[1]	94[c]	51[c]	76.4[c]	1.61	
Fruitland	105	48	77.8	0.91	
Gainesville	100	50	76.5	1.87	
Golindo	......	......	......	2.20	
Grapevine	100	53	78.0	1.25	
Hale Center†	96[c]	41	71.8	1.31	
Hallettsville†	99	65	81.0	1.22	
Hearne	98	56	81.0	0.25	
Henrietta	103	47	77.4	1.59	
Hewitt	......	......	......	1.10	
Honeygrove	......	......	......	1.48	
Houston†	92	65	79.2	2.42	
Hulen	97	66[c]	80.0[d]	5.90	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas—Cont'd	°	°	°	*Ins.*	*Ins.*
Huntsville†	94	59	78.2	0.98	
Jacksonville	93	51	77.3	3.43	
Jasper	94	61	79.2	1.44	
Junction	......	......	......	1.20	
Kent	......	......	......	1.85	
Kerrville	96	49	75.2	1.50	
Lampasas†	99	49	77.9	0.95	
Llano *†[5]	99	59	78.9	0.50	
Longview†	98	54	77.8	3.77	
Luling†	96	60	80.0	2.15	
Mann	102	59	79.2	1.15	
Marshall	91	57	77.4	3.75	
Menardville	98	49	72.4	1.63	
Mount Blanco†	99	43	69.6	0.05	
New Braunfels†	92	57	77.0	1.83	
Panter	......	......	......	0.80	
Paris	100	50	77.3	0.85	
Point Isabel *[1]	90	70	82.0	4.39	
Rheinland†	106	42	76.4	1.50	
Roby	102	39	73.0	4.91	
Rockport *[1]	90	70	82.8	......	
Rocksprings	......	......	......	1.95	
Runge†	100	64	82.2	1.85	
San Antonio	97	62	81.4	1.41	
Sanderson	99	49	74.5	0.00	
San Marcos *b*†	94	54	77.6	2.30	
Temple *a*	94	59	77.6	1.81	
Temple *b*	96	55	77.3	0.70	
Tyler	95	54	77.7	1.76	
Valentine†	91	50	72.8	0.00	
Victoria	......	......	......	1.63	
Waco	97	55	78.9	0.46	
Water Valley	......	......	......	3.02	
Waxahachie†	99	50	78.0	1.90	
Weatherford†	99	53	76.6	1.37	
Wichita Falls†	......	......	......	0.29	
Utah.					
Alpine†	......	......	......	0.05	
Blue Creek *[1]	87	36	59.6	T.	
Brigham	......	......	......	0.21	
Cisco†	90	33	66.8	0.00	
Corinne	90	28	63.4	0.26	
Ferron	97	40	69.0	0.00	
Fillmore†	99	28	64.4	T.	
Fort Duchesne†	90	26	59.7	0.08	
Frisco	85	41	64.2	0.00	
Giles	93	29	65.4	T.	
Huntsville	......	......	......	0.26	
Kelton *[1]	88	33	66.1	T.	
Levan†	85	32	60.1	0.00	
Loa	82	18	52.3	0.09	
Logan	89[c]	36[d]	62.5[c]	0.18	
Millville	......	......	......	0.26	
Minersville	89	36	63.6	0.11	
Moab†	92	32	66.3	0.00	
Mount Pleasant†	95	33	64.7	0.00	
Ogden *a* *[1]	89	43	63.6	0.30	
Pahreah	89	36	65.5	0.00	
Parowan†	87	35	62.3	0.25	
Pinto	84	28	56.2	0.00	
Promontory *[1]	84	40	63.3	......	
Provo	96	36	66.5	0.00	
Richfield†	93	12	55.0	0.00	
St. George†	102	40	72.0	0.00	
Scipio†	89	31	60.6	0.00	
Snowville	87	25	58.2	0.14	
Soldier Summit	85	20	52.1	0.02	0.2
Terrace *[1]	80	31	56.0	T.	
Tooele†	88	37	64.6	0.13	
Tropic	84	28	57.9	T.	
Vernal	83	29	58.7	1.04	
Woodruff	85	18	51.0	0.05	
Vermont.					
Bennington	91	35	64.3	4.85	
Brattleboro	91	33	63.2	2.54	
Burlington†	89	44	64.5	5.01	
Chelsea†	84	32	58.0	3.98	
Cornwall	91	32	63.0	3.76	
Enosburg Falls	90	33	62.0	4.89	
Hartland†	87	33	59.4	4.62	
Jacksonville	88	25	56.5	3.14	
Norwich	89	30	60.2	3.98	
St. Johnsbury	84	31	59.0	5.42	
Vernon *[6]	90	38	63.4	2.19	
Wells	86	32	60.9	5.16	
Woodstock	86	30	57.8	3.94	
Virginia.					
Alexandria	99	46	72.2	0.84	
Ashland†	93	45	71.1	2.86	
Bedford City	92	46	72.0	4.08	
Bigstone Gap†	90	45	70.8	1.88	
Birdsnest *†[1]	97	56	74.4	2.90	
Blacksburg	86	40	64.9	3.42	
Buckingham†	93	37	69.8	2.08	
Burkes Garden	83	36	62.8	4.71	
Callaville†	91	46	71.2	2.62	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Virginia—Cont'd.	°	°	°	Ins.	Ins.
Charlottesville	89	46	70.1	3.94	
Christiansburg	......	......	......	4.17	
Clarksville	......	......	......	4.10	
Clifton Forge	91	46	67.0	3.65	
Columbia	96	......	......	2.00	
Colemans Falls	97	48	72.6	4.26	
Dale Enterprise†	90	37	65.4	2.23	
Doswell	95	40	69.2	2.80	
Dwale	......	......	......	1.63	
Farmville	96	41	73.0	3.01	
Fredericksburg†	98	44	72.5	1.19	
Graham's Forge	82	40	64.8	4.82	
Hampton	92	59	74.3	3.68	
Hot Springs	84	40	64.2	3.90	
Lexington†	91	43	69.0	3.61	
Manassas†	96	46	70.8	1.20	
Marion	90	43	67.1	3.50	
Miller School	93	41	70.6	3.71	
Monterey	84	34	63.2	1.75	
Petersburg†	94	45	71.6	2.31	
Quantico	96	43	73.8	......	
Richmond (near)†	97	50	73.2	3.22	
Rockymount†	90	45	72.2	5.77	
Salem†	90	49	72.2	3.66	
Speers Ferry	......	......	......	3.42	
Spottsville†	92	43	70.0	2.70	
Stanardsville†	92	44	68.0	3.11	
Staunton†	96	39	69.2	2.22	
Stephens City†	94	40	68.6	0.84	
Sunbeam†	93	47	73.2	3.19	
Tobaccoville	99	40	72.5	4.62	
Warrenton	94	54	70.6	2.58	
Warsaw†	92	45	70.8	2.57	
Westbrook Farm	96	47	72.3	......	
Westpoint	93	44	73.0	3.05	
Woodstock†	93	38	67.4	0.95	
Wytheville†	88	42	68.0	6.40	
Washington.					
Aberdeen	87	42	60.8	5.93	
Anacortes	......	......	......	2.22	
Ashford†	......	......	......	6.61	
Blaine†	84	31	54.6	2.71	
Brinnon	81	41	59.0	4.67	
Cedar Lake	......	......	......	7.65	
Centerville†	95	31	58.2	1.07	
Clearwater	91	42	58.8	9.14	
Colfax	87	36	57.1	1.04	
Coupeville†	88	40	59.2	1.46	
Dayton	92	37	61.0	1.20	
Ellensburg	82	31	59.8	0.22	
Ellensburg (near)	88	34	59.8	0.25	
Fort Simcoe†	87	38	62.6	0.48	
Fort Spokane	96	28	60.0	1.00	
Grandmound†	87	40	59.8	4.47	
Hunters†	79	24	51.8	0.86	T.
Kennewick†	92	26	66.2	0.05	
Lacenter	93	43	61.3	4.50	
Lakeside	83	36	62.0	0.22	
Lapush	84	42	53.8	6.76	
Lind	96	31	64.0	0.26	
Madrone†	82	42	59.0	3.15	
Mayfield[d]	89	40	60.2	6.22	
Moxee Valley†	87	34	60.8	0.21	
New Whatcom	84	34	57.6	2.35	
Northbend	86	38	58.3	6.85	
Olga	80	39	56.1	2.55	
Olympia†	87	41	59.8	4.61	
Orcas Island	84	39	59.0	1.84	
Pinehill†	91	42	61.9	1.95	
Pomeroy	91	44	66.4	0.30	
Port Townsend	79	45	58.4	1.22	
Pullman†	92	33	60.3	1.15	
Rosalia†	90	33	58.0	0.84	
Sedro†	85	39	60.5	3.28	
Shoalwater Bay*[10]	88	46	59.5	......	
Silvania	82	40	57.3	1.94	
Snohomish†	82	43	59.9	3.26	
Southbend	92	43	61.2	7.26	
Stampede	82	33	55.8	4.92	
Sunnyside†	88	39	62.8	0.52	
Tunnel	85	32	57.0	2.20	4.0
Union City†	83	41	59.2	6.29	
Vancouver	88	41	60.9	2.89	
Vashon†	81	43	59.8	3.37	
Waterville	84[d]	28[e]	59.5[d]	0.83	
Wilbur	88	26	60.2	0.42	
West Virginia.					
Beckley	......	......	......	0.81	
Beverly†	95	42	67.7	2.30	
Bluefield	89	50	70.0	3.15	
Buckhannon *a*†	......	......	......	3.79	
Buckhannon *b*	94	37	66.3	......	
Burlington†	92	35	64.7	1.52	
Charleston†	......	......	......	3.52	
Dayton†	93	36	67.3	2.89	
Eastbank	90	49	67.6	1.89	

Stations	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
West Virginia—Cont'd.	°	°	°	Ins.	Ins.
Elkhorn†	89	46	67.4	4.22	
Fairmont†	......	......	......	2.47	
Glenville†	90	42	68.5	3.89	
Grafton†	92	37	67.0	1.87	
Green Sulphur	90	45	68.4	0.80	
Harpers Ferry	......	......	......	1.47	
Hinton *a*†	......	......	......	2.90	
Hinton *b*†	91	46	69.4	......	
Huntington	94	45	70.2	4.75	
Kingwood	91	36	65.2	3.11	
Marlinton†	85	39	64.3	3.33	
Martinsburg†	94	42	67.9	1.31	
Morgantown *b*†	96	41	71.2	2.79	
New Cumberland	97	43	69.0	1.47	
New Martinsville	96	43	70.2	2.04	
Nuttallburg	93	43	68.7	2.50	
Oldfields†	93	35.	66.4	1.10	
Philippi *a*	95	40	65.6	2.79	
Philippi *b*	......	......	......	2.84	
Point Pleasant†	96	43	73.3	2.07	
Powellton	91	49	68.8	1.77	
Romney	91	40	65.0	1.36	
Rowlesburg†	......	......	......	1.59	
Upper Tract	95	33	67.4	1.15	
Weston *a*	......	......	......	3.84	
Weston *b**†[1]	92	42	67.8	......	
Wheeling *a*†	......	......	......	3.24	
Wheeling *b*†	96	44	70.9	3.46	
White Sulphur Springs.	91	38	66.3	1.86	
Wisconsin.					
Amherst	93	30	61.2	3.23	
Barron	90	23	55.3	0.98	
Bayfield	92	36	62.0	1.60	
Beloit	89	39	65.6	2.31	
Brodhead	93	34	65.1	2.44	
Chilton	95	37	64.6	1.85	
Citypoint	97	30	63.8	2.05	
Delavan	89	34	63.8	2.80	
Dodgeville†	90	37	63.6	2.31	
Easton	94	25	63.1	1.56	
Eau Claire	96	32	63.8	0.77	
Florence†	91	26	57.6	2.48	
Fond du Lac	96	34	64.2	1.78	
Grand River Locks	......	......	......	1.64	
Grantsburg†	95	32	62.9	1.90	
Gratiot	90	32	60.8	0.85	
Hartford °	89	32	61.4	1.19	
Hartland	94	34	64.8	1.65	
Harvey	92	39	63.6	3.18	
Hayward	96	26	61.3	1.23	
Heafford Junction*[1]	97	33	58.4	2.75	
Hillsboro	93	28	61.5	2.08	
Knapp	95	23	59.5	0.69	
Koepenick*†[1]	90	40	59.5	3.70	
Lancaster†	93	37	64.3	2.48	
Lincoln	96	42	64.0	3.35	
Madison†	88	45	64.4	2.43	
Manitowoc†	96	40	61.4	2.81	
Meadow Valley†	95	29	61.8	2.24	
Medford†	99	25	60.8	1.95	
Menasha	......	......	......	2.74	
Neillsville	94	26	61.2	1.35	
New Holstein	96	38	62.4	2.10	
New London	96	34	62.5	2.67	
North Crandon	96	27	59.6	0.96	
Oconto	96	33	62.9	2.35	
Osceola†	98	26	60.8	0.87	
Pepin	96	32	62.2	0.51	
Pine River†	94	35	63.4	1.57	
Portage†	92	30	60.4	1.79	
Port Washington	95	38	62.8	2.07	
Prairie du Chien	98	35	65.8	1.86	
Prentice*[1]	92	29	60.2	1.79	
Racine	95	43	65.4	2.90	
Sharon	90	35	64.4	2.72	
Shawano	94	32	61.4	2.94	
Spooner	99	29	63.2	0.96	
Stevens Point†	95	26	61.5	1.89	
Valley Junction†	94	25	61.3	2.98	
Viroqua	90	38	62.9	2.40	
Watertown†	92	34	63.2	1.75	
Waukesha†	90	45	64.8	1.55	
Waupaca	95[b]	33	65.4[d]	2.04	
Wausau†	93	31	60.0	2.19	
Wausaukee	95	32	60.8	2.85	
Westfield†	94	34	63.0	1.25	
Westpark	94	40	65.0	1.46	
Whitehall	91	28	62.2	2.40	
White Mound	95	25	65.7	1.02	
Wyoming.					
Atlantic City	......	......	......	0.43	4.8
Basin	......	......	......	0.06	
Big Horn Ranch	85	17	51.8	0.06	T.
Big Piney	76	11	46.9	0.25	
Bitter Creek	......	......	......	0.00	
Carbon	95	18	57.0	0.00	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wyoming—Cont'd.	°	°	°	Ins.	Ins.
Cody	......	......	......	0.48	
Embar	92	23	58.4	......	
Evanston	86	27	53.6	0.50	3.0
Fort Laramie	97	25	59.3	0.44	
Fort Washakie	85	18	55.3	0.30	
Fort Yellowstone	85	25	51.9	0.90	
Labarge	86	15	48.0	0.00	
Laramie	79	19	52.0	T.	
Lovell	88	21	55.0	0.05	
Lusk	93	23	56.2	0.72	3.1
Otto	92	22	55.8	T.	
Sheridan	94	24	56.9	0.30	
Wamsutter	90	26	58.3	T.	
Wheatland	93	30	61.6	0.02	0.2
New Brunswick.					
St. John	76	33	55.6	3.80	

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Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.
Alabama.				
Lock No. 4	......	......	......	4.35
Newton	......	......	......	14.15
California.				
Point George L. H	......	......	......	0.01
San Miguel Island	86	54	60.8	0.04
Westpoint	......	......	......	0.00
Yuba City*[5]	106	64	83.8	T.
Idaho.				
Oakley	103	45	75.4	0.25
Illinois.				
Mattoon	......	......	......	2.79
Iowa.				
Albia	......	......	......	3.29
Fort Madison	......	......	......	5.12
Kansas.				
Lakin	......	......	......	2.83
Osborne	......	......	......	1.17
Massachusetts.				
Lynn *a*	87	51	73.4	8.25
Turners Falls	90	45	70.2	5.68
Michigan.				
Boise Blanc*[10]	90	50	65.0	......
Minnesota.				
Glencoe	93	39	64.7	2.61
Long Prairie	90	40	67.8	3.37
Missouri.				
Trenton	92	53	75.2	2.63
Montana.				
Glasgow	98	38	70.8	0.11
Nebraska.				
Palmyra*[1]	98[b]	53[e]	75.7[f]	1.57
New Mexico.				
Hillsboro	95	......	......	2.23
North Dakota.				
Power	......	......	......	2.52
White Earth	98	36	62.6	0.00
Oklahoma.				
Beaver	......	......	......	0.00
South Dakota.				
Hot Springs	96	44	71.2	T.
Interior	108	50	76.4	T.
Nowlin	107	40	73.0	0.11
Texas.				
Duval	......	......	......	0.76
Vermont.				
Enosburg Falls	83[d]	40[d]	65.2[d]	5.53
Wisconsin.				
Eau Claire	......	......	......	0.23

CORRECTIONS.

Arkansas, Amity, July, 1898, make mean temperature read 79.0 instead of 80.0; Moore, July, 1898, make precipitation read 4.43 instead of 4.33; Prescott, July, 1898, make precipitation read 1.80 instead of 2.80.

Mississippi, Agricultural College, August, 1898, make precipitation read 6.66 instead of 5.71; Brookhaven, August, 1898, make mean temperature read 81.8 instead of 82.0.

New York, Fleming, August, 1898, make precipitation read 4.15 instead of 4.65.

Wyoming, August, 1898, make Lovell[6], read Lovell °, and precipitation 0.99 instead of 1.08.

Arizona, Fort Mohave, August, 1898, strike out T. in precipitation column and enter note as follows: Raingauge upset by wind during a heavy wind and rain storm on the 28th, lasting about 45 minutes, during which time 8.00 inches rain fell, as determined from measurements in a tub exposed on the open mesa.

Page 343, title of section, for Prof. F. H. Bigelow read Prof. E. B. Garriott.

NOTE.—The following change has been made in the names of stations:

Washington, Cascade Tunnel, changed to Tunnel.

TABLE III.—*Data furnished by the Canadian Meteorological Service, September, 1898.*

Stations.	Pressure. Mean not reduced.	Pressure. Mean reduced.	Pressure. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Depth of snow.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	
St. Johns, N. F.	29.69	29.83	−.16	53.4	−0.6	60.5	46.2	2.42	....	....
Sydney, C. B. I	29.91	29.95	−.08	57.1	+0.6	65.9	48.3	2.76	−0.48	....
Halifax, N. S.	29.90	30.03	−.02	59.4	+1.8	68.2	50.6	4.16	+0.61	....
Grand Manan, N. B.	29.95	30.00	−.04	57.5	+1.4	64.1	50.9	3.85	+2.08	....
Yarmouth, N. S.	29.95	30.03	−.04	55.6	−0.5	63.0	48.1	4.60	+2.01	....
Charlottet'n, P. E. I.	29.92	29.96	−.06	57.7	+0.4	64.6	51.7	2.50	−0.36	....
Chatham, N. B.	29.93	29.95	−.06	56.4	+1.0	65.6	47.2	1.40	−1.32	....
Father Point, Que.	29.89	29.92	−.06	48.7	−1.7	57.1	40.3	2.23	−0.57	....
Quebec, Que.	29.64	29.96	−.06	56.1	+1.0	63.9	48.2	4.77	+1.10	....
Montreal, Que.	29.78	29.98	−.05	60.3	+1.9	67.8	52.9	6.08	+2.85	....
Rockliffe, Ont	29.46	29.96	−.07	58.6	+4.9	70.1	47.0	2.94	−0.76	....
Ottawa, Ont	29.67	29.98	.....	61.0	+3.6	72.3	49.8	3.48	....	....
Kingston, Ont	29.69	30.00	−.04	63.2	+3.2	71.1	55.3	4.75	+1.98	....
Toronto, Ont	29.65	30.03	−.03	64.2	+5.2	73.9	54.6	2.79	+0.04	....
White River, Ont.	28.59	29.92	−.07	53.3	+3.0	64.1	42.4	3.11	+0.03	....
Port Stanley, Ont	29.40	30.04	−.01	63.6	+4.1	72.7	54.4	2.79	+0.14	..
Saugeen, Ont.	29.30	30.00	−.04	63.0	+5.5	72.1	53.9	2.62	−0.89	....
Parry Sound, Ont	29.30	29.98	−.05	60.7	+4.7	70.2	51.2	2.44	−1.89	....
Port Arthur, Ont.	29.18	29.87	−.09	55.9	+3.7	65.4	46.4	5.40	+1.93	....
Winnipeg, Man.	29.00	29.82	−.10	55.6	+3.1	67.3	43.9	2.50	+0.50	....
Minnedosa, Man.	28.07	29.86	−.06	53.0	+2.5	64.8	41.3	2.42	+1.00	....
Qu'Appelle, Assin.	27.61	29.84	−.08	53.0	+1.9	65.6	40.4	3.37	+2.23	....
Medicine Hat, Assin.	......	......	......	......	......	......	......	......	......	....
Swift Current, Assin.	27.34	29.89	−.05	54.4	+1.3	67.8	41.0	0.90	−0.23	....
Calgary, Alberta	......	......	......	......	......	......	......	......	......	....
Banff, Alberta	25.33	29.94	......	48.0	......	60.6	35.4	1.72	......	0.7
Edmonton, Alberta	27.55	29.82	−.07	52.8	+3.5	67.0	38.6	0.82	−0.67	....
Prince Albert, Sask.	28.25	29.75	......	50.8	+2.4	62.9	38.7	2.21	......	....
Battleford, Sask.	28.13	29.85	......	53.5	+1.7	67.9	39.1	0.46	......	....
Kamloops, B. C.	28.62	29.88	......	60.5	......	72.2	48.8	0.72	......	....
Esquimalt, B. C.	29.89	29.92	......	57.5	+4.1	67.0	47.9	1.79	......	....
Hamilton, Bermuda	29.96	30.12	+.05	79.9	+2.5	85.2	74.6	3.29	......	....

TABLE IV.—*Mean temperature for each hour of seventy-fifth meridian time, September, 1898.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak.	53.2	52.6	51.2	50.1	48.8	47.7	47.2	46.7	49.4	53.2	58.3	62.0	64.6	67.0	68.6	69.8	70.4	69.8	68.5	65.5	61.7	58.9	56.6	54.7	58.2
Boston, Mass.	62.3	61.5	60.9	60.4	59.9	59.6	60.6	63.0	64.7	66.9	68.9	70.5	71.2	71.9	71.6	71.4	69.9	68.3	66.5	65.5	64.5	63.8	63.1	62.5	65.4
Buffalo, N. Y.	63.5	63.1	62.9	62.6	62.1	62.0	62.1	63.9	65.6	67.2	68.5	69.8	70.6	71.1	71.5	71.7	71.3	70.2	68.7	67.6	66.2	65.5	64.7	64.0	66.5
Chicago, Ill.	65.3	65.0	64.6	64.1	63.7	63.2	62.8	64.0	64.9	66.3	67.0	67.8	68.8	69.6	70.2	70.7	70.7	70.3	69.4	68.6	67.6	67.0	66.3	65.5	66.8
Cincinnati, Ohio	68.7	67.8	66.2	65.4	64.7	63.9	63.5	65.2	67.3	70.0	73.2	76.1	78.3	79.8	80.6	80.5	80.3	79.3	77.3	75.0	73.1	71.7	70.2	69.4	72.0
Cleveland, Ohio	64.1	63.3	62.7	62.2	62.0	61.1	60.7	62.3	65.1	68.0	69.3	70.1	71.2	72.1	72.8	72.6	72.4	72.1	70.9	69.7	68.0	66.9	65.4	64.5	67.1
Detroit, Mich.	63.7	63.2	62.5	61.7	61.0	60.8	60.6	61.7	64.7	67.5	70.0	71.3	72.6	73.6	74.4	74.2	73.2	71.7	69.5	68.1	66.4	65.6	64.7	64.1	66.9
Dodge, Kans.	62.4	61.4	60.3	59.3	58.3	57.8	56.9	56.1	58.8	63.2	67.8	71.8	74.9	77.1	78.3	79.3	79.8	79.4	77.1	72.6	69.5	67.0	65.1	63.7	67.4
Eastport, Me.	51.8	51.5	51.3	51.0	50.9	51.2	52.4	53.8	56.1	57.4	59.2	59.6	60.5	60.9	60.2	59.9	57.6	56.4	55.2	54.6	53.8	53.3	52.6	52.0	55.1
Galveston, Tex.	78.9	78.8	78.4	78.3	77.8	77.5	77.2	77.5	78.5	79.1	80.8	82.3	82.7	83.1	83.2	83.5	82.8	82.0	81.2	80.6	80.1	79.9	79.4	79.0	80.1
Havre, Mont.	54.2	52.7	51.0	49.3	47.8	46.9	46.0	45.4	44.9	48.3	54.6	58.1	61.9	65.2	67.3	69.1	70.5	71.1	70.2	67.8	63.8	60.0	57.4	55.4	57.4
Kansas City, Mo.	67.8	67.3	66.4	65.4	64.8	64.1	63.6	64.0	65.4	68.1	71.1	73.5	75.6	77.4	78.4	79.1	79.3	78.8	77.3	75.4	73.1	70.7	69.6	68.5	71.0
Key West, Fla.	80.4	80.1	79.7	79.7	79.6	79.8	80.4	81.4	83.3	84.4	85.0	85.2	84.8	85.2	84.9	84.4	83.5	82.6	81.7	81.5	80.6	80.2	80.4	80.5	82.1
Memphis, Tenn.	73.3	72.6	71.6	70.9	70.3	69.6	69.1	70.3	72.1	74.3	76.8	78.8	80.5	81.5	82.7	83.1	82.8	82.2	80.6	78.9	77.8	76.5	75.0	74.1	76.1
New Orleans, La.	76.2	75.9	75.6	75.5	75.3	75.1	75.0	76.1	77.8	78.9	80.8	82.1	82.8	83.1	83.5	83.0	82.7	81.7	80.6	79.4	77.9	77.3	76.8	76.2	78.7
New York, N. Y.	65.7	65.0	64.1	63.6	63.5	62.9	63.3	64.7	66.9	69.5	71.4	72.8	73.7	73.9	74.4	73.4	72.6	70.9	69.7	68.8	68.0	67.2	66.4	65.6	68.2
Philadelphia, Pa.	66.7	66.0	65.4	65.0	64.5	63.9	64.9	67.0	69.2	71.6	73.8	75.6	77.3	78.5	79.0	78.8	77.7	75.0	72.9	71.3	69.5	68.5	67.6	66.9	70.7
Pittsburg, Pa.	65.6	64.9	64.2	63.5	63.0	62.5	62.6	63.5	66.9	69.7	71.9	74.1	75.2	76.5	77.3	77.4	77.4	76.5	74.2	72.4	70.4	68.7	67.5	66.3	69.7
Portland, Oreg.	62.9	61.4	60.2	59.0	58.0	57.3	56.2	55.7	54.9	54.6	55.8	57.5	59.8	62.2	65.0	66.7	68.4	69.6	70.1	69.4	68.5	66.6	64.9	63.9	62.0
St. Louis, Mo.	70.9	69.8	69.0	68.3	67.1	66.7	66.5	67.5	69.4	71.8	74.8	77.0	79.2	79.9	80.9	81.6	81.4	80.2	78.6	76.6	75.0	73.6	72.3	71.2	73.7
St. Paul, Minn.	60.5	58.6	57.0	55.9	54.9	53.9	53.0	53.3	54.8	58.4	62.6	65.9	69.4	71.2	73.0	73.7	74.1	73.8	72.2	69.2	66.8	65.0	62.9	61.2	63.4
Salt Lake City, Utah.	62.0	61.0	59.3	58.3	58.4	56.4	55.5	56.4	55.1	59.5	63.6	68.8	71.8	73.8	76.0	76.9	77.6	77.2	76.8	75.3	70.3	66.8	64.3	62.6	66.0
San Diego, Cal.	66.4	65.8	65.2	64.8	64.3	64.1	63.6	63.7	63.3	64.2	66.3	69.7	71.1	71.6	72.0	72.4	72.3	72.6	72.5	71.8	70.3	68.8	68.0	67.2	68.0
San Francisco, Cal.	55.9	55.5	55.0	54.7	54.8	54.8	55.0	55.4	54.7	54.6	55.7	57.3	59.2	60.6	62.4	62.9	63.1	62.4	61.6	61.0	59.2	57.8	56.8	56.2	57.8
Savannah, Ga.	73.7	73.5	73.3	72.8	72.3	72.0	72.6	74.0	77.0	79.6	81.3	82.7	83.0	82.8	82.2	81.9	80.8	79.1	77.3	76.5	75.6	75.1	74.8	74.3	77.0
Washington, D. C.	65.4	65.0	64.1	63.7	62.8	62.5	62.9	66.4	70.0	73.3	75.6	77.5	79.1	80.0	80.4	79.6	79.0	77.1	73.6	70.5	69.3	68.1	66.7	65.5	70.7
West Indies.																									
Basseterre, St. Kitts.	78.3	78.1	78.0	78.2	77.8	79.7	81.6	82.8	83.8	84.7	84.8	84.7	84.0	83.8	82.6	82.0	80.4	79.5	78.7	78.6	78.6	78.3	78.5	78.3	80.7
Santo Domingo, S. D.	73.2	73.0	72.6	72.3	72.1	72.5	74.1	77.5	80.2	82.7	84.3	84.1	84.4	83.5	81.6	80.5	79.8	78.9	77.9	76.9	75.8	75.1	74.6	74.0	77.6
Willemstad, Curaçao.	79.0	78.6	78.1	78.0	78.0	79.0	81.2	82.5	83.3	83.7	84.3	85.2	85.8	86.2	86.1	85.2	83.1	81.4	80.8	80.3	79.8	79.5	79.3	79.3	81.6

TABLE V.—*Mean pressure for each hour of seventy-fifth meridian time, September, 1898.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak.	28.194	.196	.197	.196	.198	.200	.204	.208	.216	.220	.222	.220	.207	.194	.181	.168	.160	.154	.153	.152	.161	.172	.179	.184	.189
Boston, Mass.	29.898	.893	.892	.894	.901	.911	.919	.924	.928	.925	.917	.909	.894	.882	.874	.874	.877	.880	.892	.904	.908	.910	.908	.907	.901
Buffalo, N. Y.	29.218	.217	.216	.219	.227	.235	.245	.247	.248	.245	.238	.224	.212	.197	.183	.178	.177	.179	.187	.200	.206	.210	.214	.217	.214
Chicago, Ill.	29.142	.139	.140	.141	.139	.149	.160	.169	.173	.182	.181	.181	.172	.161	.148	.140	.134	.132	.130	.131	.139	.143	.145	.145	.151
Cincinnati, Ohio	29.406	.407	.405	.407	.408	.416	.424	.432	.444	.439	.434	.424	.410	.396	.377	.372	.369	.374	.378	.387	.396	.400	.401	.405	.404
Cleveland, Ohio	29.236	.235	.234	.235	.240	.248	.257	.260	.263	.260	.256	.251	.239	.222	.213	.206	.205	.208	.212	.222	.232	.235	.238	.237	.235
Detroit, Mich.	29.261	.259	.255	.257	.260	.265	.276	.279	.284	.285	.282	.269	.260	.247	.234	.229	.233	.237	.242	.250	.258	.261	.262	.262	.259
Dodge, Kans.	27.391	.388	.391	.390	.389	.391	.394	.400	.413	.419	.423	.418	.403	.392	.374	.356	.347	.344	.346	.351	.363	.378	.383	.389	.385
Eastport, Me.	29.893	.891	.893	.896	.903	.912	.918	.923	.924	.920	.914	.907	.896	.887	.880	.878	.879	.884	.894	.898	.904	.907	.904	.903	.900
Galveston, Tex.	29.885	.881	.876	.872	.872	.877	.886	.891	.903	.912	.919	.914	.896	.881	.864	.851	.847	.844	.847	.853	.867	.877	.880	.878	.878
Havre, Mont.	27.286	.288	.291	.291	.293	.295	.297	.305	.311	.311	.312	.308	.298	.287	.276	.265	.254	.248	.248	.250	.257	.267	.272	.277	.283
Kansas City, Mo.	28.984	.985	.981	.981	.985	.991	.999	.004	.017	.022	.024	.019	.007	.990	.974	.959	.948	.947	.948	.949	.968	.976	.979	.980	.984
Key West, Fla.	29.966	.959	.948	.947	.949	.953	.959	.969	.978	.986	.986	.977	.962	.947	.930	.921	.921	.925	.937	.952	.958	.971	.971	.967	.956
Memphis, Tenn.	29.610	.608	.606	.606	.608	.614	.627	.637	.645	.651	.654	.648	.632	.616	.596	.584	.577	.575	.576	.576	.584	.595	.600	.603	.610
New Orleans, La.	29.942	.937	.932	.928	.929	.937	.947	.951	.961	.967	.969	.964	.949	.931	.913	.903	.900	.902	.906	.911	.925	.934	.939	.937	.934
New York, N. Y.	29.735	.732	.731	.732	.737	.744	.751	.759	.764	.763	.756	.748	.733	.722	.713	.714	.712	.713	.722	.730	.738	.742	.743	.743	.737
Philadelphia, Pa.	29.958	.954	.951	.954	.958	.965	.974	.985	.990	.991	.985	.974	.958	.942	.930	.922	.922	.924	.934	.947	.955	.961	.961	.963	.957
Pittsburg, Pa.	29.163	.162	.164	.165	.172	.177	.198	.215	.213	.212	.211	.197	.187	.181	.174	.165	.157	.155	.155	.152	.154	.156	.162	.163	.175
Portland, Oreg.	29.787	.793	.797	.796	.797	.798	.798	.799	.802	.807	.812	.816	.817	.815	.807	.799	.786	.778	.772	.765	.763	.764	.775	.783	.798
St. Louis, Mo.	29.414	.415	.416	.417	.419	.422	.433	.447	.453	.459	.454	.447	.435	.418	.400	.387	.386	.384	.383	.387	.401	.407	.412	.413	.417
St. Paul, Minn.	29.053	.060	.064	.065	.068	.075	.082	.090	.092	.093	.091	.081	.067	.052	.038	.025	.016	.010	.010	.014	.022	.032	.043	.049	.054
Salt Lake City, Utah.	25.631	.636	.639	.645	.649	.651	.636	.660	.680	.685	.692	.695	.684	.671	.652	.634	.617	.607	.598	.594	.596	.607	.613	.620	.642
San Diego, Cal.	29.781	.782	.778	.776	.772	.770	.770	.775	.783	.793	.803	.808	.804	.798	.784	.771	.758	.752	.746	.745	.746	.755	.771	.779	.775
San Francisco, Cal.	29.792	.795	.799	.796	.795	.794	.795	.801	.811	.821	.828	.836	.833	.832	.821	.809	.793	.785	.772	.767	.767	.777	.792	.797	.800
Savannah, Ga.	29.981	.975	.972	.970	.976	.988	.999	.006	016	.021	.015	.004	.990	.973	.957	.952	.958	.956	.964	.974	.985	.986	.987	.982	.983
Washington, D. C.	29.966	.965	.965	.968	.977	.986	.000	.005	.010	.011	.005	.993	.974	.952	.943	.932	.932	.934	.940	.951	.961	.965	.969	.968	.970
West Indies.																									
Basseterre, St. Kitts.	29.877	.869	.866	.865	.873	.889	.908	.919	.926	.926	.920	.907	.889	.875	.869	.865	.874	.880	.880	.898	.901	.901	.894	.888	.890
Bridgetown, Bar.	29.919	.911	.913	.917	.928	.940	.957	.967	.974	.973	.962	.945	.924	.909	.905	.906	.911	.916	.926	.937	.944	.944	.940	.930	.933
Santo Domingo, S. D.	29.921	.908	.899	.896	.901	.915	.928	.941	.946	.948	.940	.925	.906	.889	.876	.872	.873	.886	.896	.911	.924	.932	.931	.925	.912
Willemstad, Curaçao	29.847	.836	.831	.834	.845	.857	.874	886	.890	.887	.869	.846	.818	.798	.779	.776	.784	.800	.824	.845	.868	.875	.872	.869	.842

TABLE VI.—*Average wind movement for each hour of seventy-fifth meridian time, September, 1898.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex	8.3	8.7	8.4	7.8	7.8	6.9	7.0	7.1	7.7	9.6	10.6	10.1	10.6	10.6	10.5	10.6	11.0	10.4	10.2	8.5	7.2	6.9	7.5	8.1	8.8
Albany, N. Y	4.5	4.1	3.9	4.1	3.6	4.0	4.5	5.9	6.9	7.7	8.3	9.1	10.0	9.5	10.0	9.7	9.0	7.4	5.2	4.2	4.8	5.2	4.8	4.7	6.3
Alpena, Mich	6.3	5.8	5.9	5.9	5.5	5.7	6.4	7.6	9.2	10.0	11.0	12.4	12.8	13.2	13.3	12.3	11.7	10.3	8.9	6.4	6.1	6.2	5.8	6.0	8.5
Amarillo, Tex	15.3	15.5	15.6	15.9	16.0	15.3	14.6	12.8	13.1	15.3	16.5	15.8	16.0	14.8	14.6	15.2	16.2	16.5	16.0	14.9	14.6	14.4	14.7	15.3	15.2
Atlanta, Ga	6.5	6.7	6.5	6.5	7.5	7.3	7.9	7.8	8.1	8.5	8.9	9.2	8.3	8.5	8.3	8.2	7.9	7.0	6.4	5.9	7.0	6.9	6.6	6.6	7.5
Atlantic City, N. J	8.9	8.6	8.5	8.5	8.1	7.9	8.5	9.1	10.0	10.7	10.7	10.7	11.0	11.4	11.4	11.3	10.3	9.2	8.6	8.7	9.2	9.0	9.0	8.5	9.5
Augusta, Ga	3.8	3.6	3.6	3.8	4.1	4.2	4.6	4.9	6.3	6.8	7.6	7.7	8.2	8.6	7.5	7.6	7.6	5.9	4.6	4.5	3.5	3.2	3.0	3.3	5.4
Baker City, Oreg	4.3	5.7	6.6	6.8	7.9	7.8	8.0	8.4	8.4	7.6	5.5	3.3	3.6	4.9	5.5	6.0	5.9	6.0	5.6	6.0	4.3	3.4	4.1	3.8	5.8
Baltimore, Md	3.5	3.8	3.7	3.5	3.5	3.2	3.3	4.1	4.8	5.5	6.1	5.8	6.4	7.2	7.5	7.0	6.4	5.3	3.9	4.1	4.2	4.1	3.8	3.3	4.8
Bismarck, N. Dak	5.5	6.2	6.0	6.1	7.1	6.9	6.6	6.5	6.8	8.3	9.8	12.5	13.7	14.2	14.2	14.0	13.9	12.8	10.7	8.6	7.9	7.5	6.5	5.9	9.1
Block Island, R. I	12.2	12.2	12.4	12.7	12.4	12.3	12.7	13.9	14.0	14.8	15.1	14.9	15.5	15.8	15.9	15.3	14.2	12.3	12.0	11.7	12.4	12.5	13.2	12.9	13.5
Boston, Mass	7.9	8.4	8.5	8.2	7.9	8.5	8.6	9.1	10.1	10.3	10.6	11.0	12.0	12.0	11.8	11.8	11.3	9.4	8.9	8.4	9.0	8.4	8.5	8.7	9.6
Buffalo, N. Y	12.0	11.4	11.4	11.1	11.0	11.8	10.8	11.6	13.0	13.9	15.0	15.5	16.8	17.8	17.2	16.8	16.7	15.5	13.8	13.5	13.0	12.9	12.5	12.6	13.6
Cairo, Ill	5.9	5.6	5.9	5.6	5.5	5.3	6.1	5.4	6.1	6.6	6.9	8.1	8.8	9.0	9.4	9.8	8.8	7.0	6.5	6.9	6.3	6.1	5.7	5.9	6.8
Cape Henry, Va	12.8	12.7	12.2	12.2	11.8	12.3	12.7	13.7	13.2	13.1	13.8	13.1	13.8	13.9	14.1	14.2	13.7	12.5	12.6	12.0	12.2	12.9	12.4	12.5	12.9
Carson City, Nev	6.6	5.8	4.8	3.9	4.1	3.5	3.9	4.0	3.6	3.7	3.7	3.7	5.2	6.8	7.7	8.6	9.8	10.4	11.1	11.5	11.2	8.4	8.2	8.0	6.6
Charleston, S. C	9.2	9.8	9.9	10.1	9.9	10.2	10.8	11.9	12.2	13.2	13.6	13.0	13.6	13.8	14.2	14.6	14.3	12.4	10.8	10.1	10.3	9.5	9.3	9.2	11.5
Charlotte, N. C	4.5	4.7	5.0	5.1	5.0	4.9	4.9	5.6	6.4	7.1	7.6	7.3	7.2	7.2	7.2	7.0	5.6	5.3	4.5	4.8	4.7	4.7	4.8	4.8	5.7
Chattanooga, Tenn	3.2	3.7	3.6	3.3	3.7	3.8	4.2	4.5	4.4	6.1	7.4	8.0	8.2	7.6	7.4	7.6	7.5	6.0	5.1	4.3	3.9	3.6	3.6	3.7	5.2
Cheyenne, Wyo	7.8	7.5	7.0	6.9	7.3	7.7	8.7	8.1	8.1	8.7	9.5	11.1	12.4	13.2	12.9	11.9	12.3	12.9	12.7	10.9	9.4	8.3	8.3	7.8	9.6
Chicago, Ill	17.7	16.6	15.6	16.0	16.7	16.3	16.0	15.1	16.1	15.6	15.4	15.5	15.2	15.2	16.2	16.5	16.1	15.9	15.5	15.4	15.5	15.9	16.3	16.4	15.9
Cincinnati, Ohio	4.6	4.8	4.8	4.8	5.0	5.3	6.0	6.1	7.0	7.7	7.7	8.2	8.6	8.8	8.8	9.0	9.0	8.6	6.9	6.6	5.5	4.9	4.8	5.2	6.6
Cleveland, Ohio	13.8	14.1	14.7	14.6	14.2	13.6	13.5	13.1	11.6	11.4	12.5	13.2	13.2	13.6	14.5	14.2	14.1	13.0	11.7	12.5	13.4	13.2	13.8	13.8	13.4
Columbia, Mo	6.4	6.1	5.8	5.5	5.6	5.7	5.6	5.4	5.7	6.9	7.8	8.3	8.9	9.1	9.3	9.6	9.3	8.7	6.9	6.8	6.9	7.0	6.8	7.1	7.1
Columbus, Ohio	4.9	4.8	4.5	5.0	5.3	4.9	5.0	4.9	6.2	7.8	8.4	8.3	8.9	9.0	8.8	9.0	8.6	7.5	7.2	6.7	6.6	6.4	6.1	5.3	6.7
Concordia, Kans	6.5	6.3	5.8	5.1	4.9	5.2	4.9	5.1	6.0	8.0	8.6	9.5	9.4	9.8	9.6	9.7	9.7	8.6	7.7	5.8	5.5	5.9	6.2	6.3	7.1
Corpus Christi, Tex	11.8	10.7	9.3	8.3	7.8	7.9	7.7	8.0	7.9	8.6	9.6	10.0	12.0	13.2	13.7	15.1	15.5	15.0	15.2	13.9	12.9	12.7	12.8	12.1	11.3
Davenport, Iowa	5.9	5.7	5.2	5.3	4.7	4.6	5.1	5.0	6.1	7.5	8.2	8.2	8.5	9.0	9.2	9.2	8.8	7.7	6.9	5.8	5.6	5.9	6.1	5.9	6.7
Denver, Colo	8.0	7.9	7.0	6.7	6.9	6.3	7.0	7.2	7.2	6.7	6.1	6.1	6.6	8.0	8.4	8.4	9.0	9.4	9.2	9.3	8.8	8.5	8.3	8.1	7.7
Des Moines, Iowa	5.0	5.2	5.5	5.2	4.7	4.7	4.2	4.2	4.7	5.7	7.5	8.0	9.4	10.0	10.0	10.2	10.1	9.2	7.2	6.4	5.2	5.0	5.3	5.0	6.6
Detroit, Mich	7.7	7.8	7.1	7.6	8.3	7.9	7.5	8.2	8.4	9.6	10.3	11.0	12.0	12.3	12.7	12.4	11.7	9.8	7.5	6.8	7.4	7.6	7.8	7.6	9.1
Dodge, Kans	9.3	8.7	8.8	8.3	8.3	8.2	7.8	7.8	8.3	10.6	12.0	12.1	12.6	13.5	13.9	13.6	13.1	12.4	12.1	10.0	9.1	9.2	9.0	9.1	10.3
Dubuque, Iowa	4.6	4.0	4.2	4.3	4.2	4.5	4.6	4.5	5.0	6.1	7.3	8.6	8.9	9.0	9.4	9.4	9.0	7.4	5.6	4.7	4.2	4.4	5.1	4.9	6.0
Duluth, Minn	10.1	10.1	9.5	8.7	8.5	8.5	9.0	9.0	9.3	8.8	9.9	10.8	12.2	12.5	12.1	11.7	11.6	10.8	9.6	9.2	9.9	9.5	9.3	9.0	10.0
Eastport, Me	7.2	6.9	7.1	7.0	6.5	6.6	6.8	7.4	8.4	9.0	9.6	10.2	10.5	11.0	10.7	10.9	9.9	9.3	8.2	8.0	8.0	7.3	7.4	7.1	8.4
El Paso, Tex	10.6	9.9	10.1	9.5	9.9	9.8	9.2	8.8	8.1	8.4	10.1	9.6	9.8	9.9	10.3	10.8	10.8	10.9	11.8	10.9	10.1	9.8	9.4	9.9	9.9
Erie, Pa	10.4	10.4	10.8	10.6	10.2	10.3	10.3	10.0	10.5	10.7	10.9	10.4	10.8	11.7	12.3	12.4	11.1	9.4	7.7	8.5	9.4	9.5	10.3	10.2	10.4
Eureka, Cal	3.8	3.5	3.0	3.3	2.8	2.9	2.8	2.7	2.6	3.1	3.8	4.1	4.4	5.4	6.5	7.8	8.5	8.7	8.5	7.7	6.8	5.1	4.0	4.3	4.8
Evansville, Ind	5.2	5.0	4.9	5.3	5.3	5.6	5.9	6.1	6.8	6.9	7.0	7.2	7.2	7.7	7.4	7.8	7.9	7.4	5.3	4.7	5.1	4.7	4.6	5.1	6.1
Fort Canby, Wash	12.7	12.7	12.6	11.8	12.4	11.0	9.2	9.1	9.2	9.7	9.6	10.4	11.7	12.4	12.4	14.1	14.2	13.8	12.6	13.3	13.3	13.3	13.0	13.1	12.0
Fort Smith, Ark	3.9	4.1	4.1	4.1	4.2	4.3	3.7	3.7	4.1	4.6	4.5	4.8	4.9	5.2	5.1	5.2	5.5	5.1	4.8	4.5	4.4	4.4	3.9	3.9	4.5
Fresno, Cal	5.9	5.6	5.6	5.1	4.7	4.1	4.0	3.9	4.1	3.3	3.6	3.5	4.1	4.4	4.2	4.2	4.4	4.8	4.9	5.0	4.7	4.9	5.6	5.4	4.6
Galveston, Tex	8.7	8.2	7.8	7.2	6.8	6.6	7.2	7.2	8.0	8.5	8.2	8.1	8.7	8.9	9.0	8.9	8.8	8.4	7.9	7.8	7.4	7.8	7.8	7.8	8.0
Grand Haven, Mich	7.2	7.0	7.5	7.5	7.8	7.8	7.3	7.7	8.6	9.3	10.1	10.5	10.8	10.7	10.2	9.8	9.2	7.6	6.9	6.2	6.2	6.2	6.7	7.1	8.2
Green Bay, Wis	5.3	5.2	5.4	5.6	5.8	5.6	5.4	6.2	6.9	7.9	9.0	9.4	9.3	9.7	9.9	9.8	9.3	8.2	6.6	6.0	6.1	5.8	5.5	5.4	7.1
Hannibal, Mo	7.4	7.8	7.7	7.6	6.8	7.6	7.9	7.0	8.3	9.3	10.2	10.6	10.1	10.5	11.7	11.1	11.4	10.3	8.6	7.5	7.8	7.6	8.3	7.7	8.8
Harrisburg, Pa	3.9	3.6	3.7	4.0	3.5	4.3	4.0	4.8	5.5	6.3	6.9	7.1	8.3	8.9	8.7	8.8	7.6	7.0	5.6	4.4	4.3	4.0	4.2	4.0	5.6
Hatteras, N. C	12.8	13.2	12.7	12.5	12.8	12.4	12.3	13.4	13.8	13.6	14.0	14.0	14.7	14.9	14.6	14.3	14.4	13.1	13.5	13.3	13.1	12.8	12.9	12.8	13.4
Havre, Mont	7.1	7.0	7.1	7.1	7.4	8.4	8.9	8.2	8.5	9.2	10.8	11.2	11.5	12.0	11.9	11.5	11.9	11.0	11.7	10.3	8.7	7.3	7.1	8.3	9.3
Helena, Mont	8.9	7.8	7.5	7.8	7.4	7.5	6.7	6.3	6.2	4.4	4.7	5.8	6.9	7.6	7.9	8.6	9.6	8.1	7.7	7.1	7.9	8.9	10.0	9.8	7.5
Huron, S. Dak	10.2	10.5	10.1	9.8	9.7	9.3	9.0	8.7	9.8	11.5	12.7	14.0	13.6	14.5	14.9	15.4	15.2	14.5	12.3	10.2	10.3	10.0	10.1	10.0	11.5
Idaho Falls, Idaho	10.5	9.5	9.4	9.5	9.3	9.0	8.4	8.8	7.8	7.7	9.3	10.2	11.2	11.0	12.4	14.9	15.2	15.3	14.5	13.4	11.3	10.6	10.4	10.7	10.8
Independence, Cal	6.2	6.1	5.8	6.3	6.2	5.4	5.4	5.7	5.7	5.7	6.1	7.0	7.2	7.0	6.9	8.5	10.0	10.9	11.5	10.8	8.9	8.7	8.2	7.6	7.4
Indianapolis, Ind	8.0	8.5	8.2	8.1	7.8	7.8	7.9	7.9	9.4	10.4	11.1	11.0	11.3	11.6	12.1	12.4	11.5	10.1	9.1	8.2	8.2	8.1	8.5	8.0	9.4
Jacksonville, Fla	5.3	5.4	5.4	5.5	5.6	5.2	5.2	6.0	7.8	8.8	9.7	10.3	10.5	10.2	10.6	10.6	10.6	10.2	7.9	7.0	6.4	5.9	6.3	5.8	7.6
Jupiter, Fla	10.3	10.2	9.7	9.6	8.9	9.2	10.0	10.2	10.9	11.9	11.4	12.0	12.6	13.1	12.6	12.3	12.0	11.5	11.0	10.5	10.3	11.1	10.7	11.0	11.0
Kansas City, Mo	7.3	7.1	7.2	7.2	7.2	7.0	6.4	6.4	6.8	7.5	8.6	8.9	10.3	10.5	10.9	10.7	10.5	9.5	8.1	7.1	7.3	6.9	7.7	7.0	8.1
Keokuk, Iowa	5.8	5.2	5.5	5.4	6.0	5.6	5.5	5.4	6.2	7.2	8.1	8.2	8.2	8.7	8.8	8.9	8.4	7.2	5.6	5.0	5.1	5.8	6.6	7.0	6.6
Key West, Fla	7.2	7.2	6.8	5.9	5.8	6.2	6.7	7.0	7.4	8.2	8.9	8.7	8.6	8.5	8.2	8.0	7.7	7.4	6.9	7.1	7.2	7.5	7.2	7.1	7.4
Kittyhawk, N. C	14.7	15.1	15.1	15.1	14.8	14.8	14.8	15.9	15.8	15.7	15.2	14.5	15.0	15.4	15.5	15.8	16.1	15.6	15.5	15.8	16.1	16.0	16.6	16.2	15.5
Knoxville, Tenn	4.7	5.0	4.4	4.4	4.6	4.3	4.7	4.2	5.2	6.0	6.3	6.4	6.7	6.3	6.3	6.6	5.9	5.7	5.8	5.0	4.3	5.0	4.9	5.0	5.3
La Crosse, Wis	4.3	4.3	4.9	5.8	5.4	5.0	4.3	4.4	5.2	5.5	6.1	7.0	7.9	7.9	8.6	8.8	8.6	7.8	6.2	5.0	4.7	5.1	5.3	4.9	6.0
Lander, Wyo	4.8	4.7	4.2	3.0	3.0	2.7	2.9	2.5	2.2	2.5	3.1	3.5	4.4	5.4	6.2	7.4	7.7	8.1	6.8	6.0	6.1	5.8	5.7	5.2	4.7
Lexington, Ky	8.0	7.8	7.9	8.0	8.4	8.4	8.3	8.1	8.8	9.9	9.4	9.4	9.6	8.5	9.4	9.5	9.8	8.3	7.4	7.7	6.7	7.3	7.9	7.8	8.4
Little Rock, Ark	5.2	4.8	4.4	4.7	4.6	4.6	4.6	4.7	6.3	6.5	7.3	8.3	9.2	9.1	9.2	8.9	8.5	8.3	6.5	5.8	5.8	5.0	4.7	5.1	6.3
Los Angeles, Cal	2.2	1.6	1.5	1.6	1.1	1.4	1.4	1.6	1.5	1.9	2.6	3.1	3.6	4.3	6.1	7.3	8.3	8.7	8.3	7.6	6.0	4.4	2.8	1.9	3.8
Louisville, Ky	5.0	6.2	5.9	5.0	5.5	6.1	5.4	6.0	6.8	7.5	8.0	8.3	8.6	8.6	9.2	9.2	9.1	8.4	6.4	6.3	5.7	5.0	5.6	5.2	6.8
Lynchburg, Va	1.4	1.1	1.5	1.3	1.4	1.2	1.4	2.3	3.7	4.6	4.8	5.3	5.7	5.5	5.6	5.3	5.3	4.2	2.8	2.2	1.8	1.8	1.8	1.5	3.1
Marquette, Mich	9.6	9.5	9.3	9.8	9.9	10.6	9.7	9.7	9.3	10.6	10.7	12.3	13.1	12.9	13.0	12.2	10.9	9.2	7.7	7.8	8.3	9.9	9.9	10.2	10.3
Memphis, Tenn	9.1	8.7	8.2	9.0	9.3	8.9	9.5	9.5	9.0	9.6	10.1	10.3	11.1	11.1	10.8	9.9	10.7	9.3	8.1	8.3	8.3	8.5	8.9	9.3	9.4
Milwaukee, Wis	7.1	7.5	7.2	7.7	7.1	7.2	7.6	7.5	8.3	8.4	9.3	10.2	11.5	11.6	11.5	11.0	10.7	9.4	8.1	6.8	6.6	6.5	6.7	6.9	8.4
Minneapolis, Minn	9.9	8.8	8.6	8.2	8.0	7.9	8.4	8.3	7.6	8.2	9.6	10.6	11.2	11.1	11.1	11.4	11.4	10.8	10.3	10.0	10.1	10.2	10.1	9.7	9.6
Mobile, Ala	5.6	5.6	5.8	5.4	5.1	4.9	5.5	5.6	6.1	6.8	6.8	6.8	8.1	8.5	8.1	8.6	7.6	7.6	7.1	6.3	6.5	6.0	6.0	5.7	6.5
Montgomery, Ala	5.1	4.7	4.4	4.5	4.2	4.4	4.6	5.1	5.8	6.8	7.0	7.2	7.2	7.8	8.2	6.8	6.4	5.6	4.7	4.5	4.8	5.4	5.3	5.0	5.6
Moorhead, Minn	8.2	7.9	7.9	8.0	8.0	8.0	8.3	8.3	8.3	10.1	10.7	12.7	13.7	14.0	13.7	12.7	13.0	11.8	10.9	8.7	8.2	8.1	8.3	8.4	9.9
Nantucket, Mass	9.2	9.2	9.5	9.0	9.6	9.9	9.5	10.2	10.4	11.6	11.4	11.5	11.2	11.2	10.8	10.0	9.5	8.7	8.0	8.1	8.1	8.9	9.3	9.5	9.8
Nashville, Tenn	3.9	3.7	3.3	3.6	3.9	3.7	3.9	4.4	5.0	6.0	6.5	7.7	8.6	8.4	8.3	8.4	8.5	7.6	6.4	6.2	6.0	5.0	4.2	3.9	5.7
Neah, Wash	5.2	4.8	4.8	4.2	4.2	4.6	4.2	4.5	4.4	4.0	3.9	5.2	5.5	6.5	7.1	7.2	8.3	7.6	7.8	7.6	6.7	6.1	5.7	5.1	5.7
New Haven, Conn	6.1	5.9	6.1	5.8	5.5	5.6	5.8	6.4	7.8	8.1	8.7	9.9	11.2	11.5	11.5	10.1	8.5	7.5	7.1	6.7	6.5	6.7	6.3	5.9	7.5
New Orleans, La	6.5	6.5	6.4	7.0	7.0	7.4	7.4	7.4	8.7	9.9	10.1	10.6	10.6	10.6	10.7	9.6	8.7	8.6	7.8	7.0	7.1	7.4	7.4	6.7	8.2
New York, N. Y	10.4	9.6	9.3	8.9	8.3	8.9	8.9	8.9	8.8	8.7	8.9	9.7	10.7	11.4	12.4	12.5	12.2	11.4	11.8	11.4	11.1	10.5	10.0	10.6	10.2
Norfolk, Va	6.6	6.7	6.3	6.1	6.4	6.2	6.3	7.4	8.3	9.0	9.3	9.1	9.6	10.1	10.1	10.1	9.4	7.9	6.9	6.8	6.3	6.3	6.5	6.4	7.7
Northfield, Vt	6.2	5.8	5.5	6.1	6.5	6.4	6.6	6.4	7.3	8.8	10.2	11.2	11.7	11.4	10.9	10.0	9.3	7.8	6.2	6.7	6.2	6.4	6.1	6.3	7.7
North Platte, Nebr	7.3	6.6	6.1	5.7	6.0	5.5	5.7	5.8	5.7	6.4	7.9	9.7	10.8	12.0	11.8	12.0	11.8	11.0	10.4	8.5	8.4	8.2	7.7	8.0	8.3
Oklahoma, Okla	8.3	7.5	7.0	6.6	6.6	6.7	6.5	6.7	7.3	9.6	10.8	11.0	11.5	11.8	12.1	11.9	11.9	11.3	10.2	8.6	7.8	7.8	8.2	8.1	9.0

TABLE VI.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Omaha, Nebr	7.3	7.2	7.1	6.6	5.9	5.6	4.9	5.4	6.1	6.9	7.1	8.2	9.2	10.1	10.4	10.7	10.0	9.7	7.8	6.4	5.9	6.6	6.6	7.0	7.4
Oswego, N. Y	9.7	9.9	9.1	8.9	9.7	9.7	10.1	10.6	10.6	10.8	10.6	10.1	10.7	10.3	9.8	9.8	8.9	7.9	8.1	8.5	8.7	8.8	10.3	10.7	9.7
Palestine, Tex	5.3	5.0	4.6	4.5	4.3	4.2	4.3	4.2	4.8	6.2	7.3	7.2	7.5	7.2	7.5	7.9	7.6	7.2	7.0	5.1	4.6	4.9	5.5	5.4	5.8
Parkersburg, W. Va	3.6	3.5	3.4	3.2	3.3	3.4	3.2	3.8	4.9	4.9	5.9	5.9	6.2	6.8	6.7	6.4	6.4	5.0	3.8	3.6	3.0	4.0	4.3	4.3	4.6
Pensacola, Fla	8.2	8.3	9.0	9.3	9.3	9.4	9.5	10.0	10.5	11.1	11.1	11.0	10.3	11.0	11.0	10.3	10.2	9.9	9.8	8.8	8.1	8.0	7.9	8.1	9.6
Philadelphia, Pa	7.3	7.4	7.1	6.9	6.8	7.1	7.7	8.2	8.8	9.2	9.7	9.5	10.2	10.1	10.2	10.8	10.4	10.3	8.9	8.0	8.1	7.6	7.7	8.0	8.6
Phenix, Ariz	3.6	3.9	4.0	4.4	4.6	4.5	4.5	4.2	4.6	4.7	5.3	5.5	5.8	5.4	5.0	4.9	5.2	5.2	5.1	4.1	3.2	3.2	3.2	3.2	4.5
Pierre, S. Dak	6.5	5.0	4.8	4.6	5.5	6.1	5.6	6.3	6.0	6.7	8.5	10.7	12.0	12.2	12.0	12.5	12.4	11.7	11.3	8.9	7.4	7.9	7.9	7.7	8.3
Pittsburg, Pa	3.6	3.4	3.6	3.3	3.3	3.6	3.5	4.0	4.9	5.9	6.7	7.0	7.4	8.0	7.8	8.1	7.9	6.8	5.8	5.1	4.5	4.3	4.1	4.1	5.3
Point Reyes Lt., Cal	22.1	21.0	19.9	19.7	20.3	19.6	19.3	19.3	19.1	18.3	17.1	15.5	15.7	16.0	16.9	17.8	19.0	19.6	20.9	22.5	22.3	22.8	22.8	22.3	19.6
Port Angeles, Wash	5.4	5.1	4.4	4.2	4.4	4.2	4.5	5.0	4.2	4.1	3.5	3.4	4.2	4.7	5.5	6.0	6.1	6.1	6.3	6.0	5.2	5.3	4.6	5.2	4.9
Port Huron, Mich	8.8	8.3	8.6	8.6	8.6	8.4	8.0	7.8	8.2	9.9	10.8	11.7	12.2	13.0	13.6	13.1	12.4	10.7	9.4	8.4	8.3	8.5	8.7	9.3	9.8
Portland, Me	4.0	4.4	4.4	4.1	4.2	4.8	4.2	5.2	6.1	7.0	8.2	8.3	8.7	8.9	9.5	9.1	7.7	6.7	5.8	5.6	4.7	4.8	4.8	4.2	6.1
Portland, Oreg	9.0	8.2	7.1	7.3	6.6	6.8	6.5	6.6	7.1	6.5	6.9	8.4	9.1	9.0	10.2	10.4	11.1	10.2	9.6	9.8	9.3	9.3	9.0	9.3	8.5
Pueblo, Colo	6.6	6.0	5.4	5.0	4.9	4.9	5.3	4.9	4.8	4.4	4.2	5.6	6.6	8.0	8.9	9.5	9.8	10.2	10.3	9.0	7.6	6.7	5.6	5.6	6.7
Raleigh, N. C	4.8	4.9	4.7	4.8	4.7	5.1	5.0	5.8	7.0	8.3	8.7	8.5	8.3	8.3	8.0	7.3	6.8	5.5	4.1	4.6	4.5	4.9	4.9	5.3	6.0
Rapid City, S. Dak	6.4	6.2	6.0	5.4	6.0	5.9	5.4	5.7	5.6	6.7	8.3	9.1	10.4	11.1	10.9	10.5	10.7	10.2	10.8	8.6	7.4	7.0	6.3	6.1	7.8
Red Bluff, Cal	4.8	5.6	5.9	6.3	6.3	6.8	5.8	5.3	4.6	3.7	3.6	4.4	5.1	5.3	5.1	5.2	5.8	5.5	5.9	6.5	5.9	5.5	5.4	4.8	5.4
Richmond, Va	3.9	4.5	4.3	4.3	4.5	5.2	5.6	6.3	7.0	7.4	7.5	7.4	7.6	7.2	7.4	7.4	7.0	6.2	5.0	4.5	4.3	4.2	4.4	4.3	5.7
Rochester, N. Y	6.2	5.7	6.1	5.9	6.2	5.8	5.5	6.5	7.3	8.2	8.4	8.5	9.1	9.8	9.1	8.6	8.6	7.7	5.9	5.5	6.1	6.2	6.1	6.0	7.1
Roseburg, Oreg	2.5	2.4	2.1	1.9	2.3	2.4	2.6	2.1	2.3	2.0	2.0	2.6	3.2	3.8	4.2	4.6	5.5	6.0	6.9	7.2	6.9	5.0	3.6	2.4	3.6
Sacramento, Cal	9.0	8.6	9.1	9.3	9.3	9.2	8.8	7.7	7.3	6.5	6.0	6.1	6.4	6.8	6.9	7.6	7.9	8.1	8.9	8.8	8.4	8.9	8.8	8.7	8.0
St. Louis, Mo	8.4	8.7	8.7	7.7	7.9	8.0	7.7	8.1	8.9	9.5	10.1	9.8	9.8	10.7	11.1	10.7	10.7	10.7	10.1	8.9	8.5	8.8	8.7	8.5	9.2
St. Paul, Minn	5.4	4.9	4.7	4.3	4.3	4.2	4.2	4.3	4.7	5.7	7.0	8.7	9.5	10.0	10.2	9.8	10.0	9.3	7.4	7.2	7.3	7.4	6.5	5.9	6.8
Salt Lake City, Utah	4.7	4.8	4.8	5.0	4.9	4.9	4.7	4.7	5.5	5.0	5.2	5.9	6.9	7.5	9.0	9.1	9.8	9.9	7.9	6.5	5.6	5.0	5.1	5.0	6.2
San Antonio, Tex	7.1	6.2	5.8	6.3	6.1	6.2	6.3	6.4	6.8	7.7	7.7	8.5	8.7	9.6	9.6	9.6	9.1	9.0	9.1	7.9	8.5	9.1	9.1	7.8	7.8
San Diego, Cal	2.2	2.3	2.5	2.3	2.4	2.5	2.6	2.7	2.6	2.5	2.8	4.1	6.4	9.2	10.5	11.0	11.5	11.1	10.0	8.7	7.4	5.7	3.9	3.2	5.4
Sandusky, Ohio	6.8	6.7	6.6	6.5	7.1	7.5	7.0	6.6	7.1	7.4	8.1	8.0	8.4	8.6	8.3	8.4	8.0	7.2	6.8	6.5	6.2	6.0	6.2	6.3	7.2
San Francisco, Cal	11.4	11.0	9.8	9.1	8.2	7.8	6.7	6.5	7.0	6.7	6.8	7.2	8.8	10.5	13.0	15.5	18.1	19.8	20.0	20.1	19.6	16.6	14.2	11.9	11.9
San Luis Obispo, Cal	2.3	2.5	2.6	3.2	3.1	3.5	3.6	3.4	3.2	3.3	4.0	4.7	5.0	5.7	7.1	7.6	7.7	7.4	7.0	6.9	5.3	4.3	4.1	3.3	4.6
Santa Fe, N. Mex	3.8	3.7	3.8	3.3	3.2	2.8	3.1	2.8	3.0	2.9	4.4	5.5	7.4	7.6	8.1	9.2	9.3	9.5	8.7	7.3	5.1	5.3	5.4	4.9	5.4
Sault Ste. Marie, Mich	4.8	5.2	5.7	5.3	6.2	6.8	7.5	8.2	9.6	9.8	10.5	11.3	12.2	12.1	12.1	12.0	11.5	9.8	8.5	6.9	5.7	5.2	5.0	4.8	8.2
Savannah, Ga	5.8	5.8	5.9	6.4	6.5	6.2	5.6	6.9	8.1	9.2	9.6	9.7	10.1	10.6	10.8	10.9	10.4	9.0	7.6	6.9	6.5	6.6	6.3	6.6	7.8
Seattle, Wash	3.8	3.9	3.8	4.1	3.3	3.6	3.6	4.0	4.3	4.3	4.3	4.9	5.6	6.0	6.4	6.5	6.9	7.4	7.4	6.9	6.7	5.9	4.6	4.0	5.1
Shreveport, La	5.5	5.5	5.1	4.9	4.8	4.5	3.9	4.3	5.4	5.9	6.4	6.8	7.1	6.9	7.1	7.5	7.2	6.9	6.2	5.0	4.8	5.2	5.3	5.1	5.7
Sioux City, Iowa	9.2	9.6	9.2	8.2	8.6	8.6	8.1	8.2	8.9	9.7	10.4	12.2	14.2	14.1	14.4	14.7	14.7	14.2	12.6	11.5	10.5	10.4	10.5	9.6	10.9
Spokane, Wash	5.2	4.8	4.8	4.7	5.1	5.3	5.0	4.8	4.3	4.4	5.5	6.4	7.1	7.7	7.6	7.9	7.9	8.0	8.2	7.8	6.7	5.7	5.4	5.3	6.1
Springfield, Ill	8.8	8.2	7.8	7.4	7.0	7.4	6.8	7.0	7.4	8.0	8.7	8.8	9.3	9.9	10.1	9.6	9.1	8.3	7.4	6.5	6.7	7.6	7.6	8.7	8.1
Springfield, Mo	8.8	8.6	8.8	7.9	8.4	8.7	9.1	8.7	8.6	9.9	10.1	11.0	11.3	10.5	10.4	10.7	10.4	10.0	8.2	7.8	7.7	8.4	8.6	8.5	9.2
Tacoma, Wash	4.6	3.6	3.7	3.6	3.2	3.3	3.2	3.9	3.5	3.2	3.4	4.4	5.5	7.4	8.2	8.4	8.1	7.6	6.8	6.7	6.4	6.4	6.1	5.4	5.3
Tampa, Fla	4.6	4.0	4.0	4.1	4.2	4.3	4.7	5.9	7.2	7.4	7.5	6.6	7.3	6.7	6.9	7.8	6.6	6.4	5.8	5.7	5.3	5.1	5.0	4.6	5.7
Toledo, Ohio	7.4	7.4	7.1	7.2	7.3	7.4	7.9	8.1	8.9	10.0	10.4	11.3	11.5	12.1	11.7	11.4	11.4	10.5	8.3	7.4	6.8	6.7	6.6	7.3	8.8
Vicksburg, Miss	6.7	6.7	6.4	6.1	6.0	6.1	6.0	6.1	5.6	6.0	6.8	7.3	8.0	8.0	8.0	8.1	7.8	7.3	6.0	5.4	5.7	6.3	7.3	7.1	6.7
Vineyard Haven, Mass	7.1	6.8	7.0	7.2	7.3	6.8	6.9	7.6	8.4	9.0	9.3	9.5	9.9	9.8	9.8	9.2	8.7	7.5	7.1	7.0	6.7	6.8	7.3	7.2	7.9
Walla Walla, Wash	5.4	4.7	4.5	4.8	4.9	4.8	4.5	4.7	4.4	4.4	4.1	4.7	5.7	6.1	6.0	5.8	6.1	6.0	6.2	6.4	5.4	5.2	5.2	5.6	5.2
Washington, D. C	3.7	3.6	3.5	3.6	3.4	3.4	3.8	4.4	4.8	6.1	6.7	7.2	7.6	7.7	7.9	7.3	6.6	5.6	4.9	4.3	3.9	3.5	3.3	3.4	5.0
Wichita, Kans	6.1	6.3	6.2	6.2	5.7	5.6	5.1	5.7	6.3	7.5	8.4	8.9	9.7	9.8	10.0	9.6	9.7	9.4	8.2	6.5	6.1	6.6	6.5	6.4	7.4
Williston, N. Dak	6.2	6.4	6.5	5.9	6.5	7.0	6.9	7.9	8.0	8.5	9.5	9.9	11.9	12.9	13.9	14.0	14.6	14.1	12.8	9.8	7.2	7.5	7.2	5.9	9.2
Wilmington, N. C	6.8	6.4	6.5	6.2	6.4	6.1	6.4	7.8	8.9	9.8	10.5	10.9	11.1	11.0	10.6	10.9	10.2	9.3	7.7	7.4	7.1	7.0	6.9	6.7	8.3
Winnemucca, Nev	8.2	8.1	7.6	7.9	8.5	8.4	8.1	8.7	8.4	8.4	8.6	9.2	10.1	11.3	10.7	10.5	10.6	10.2	10.2	9.8	8.2	6.1	6.2	7.2	8.8
Woods Hole, Mass	13.5	13.3	13.4	14.3	13.5	13.2	12.5	13.5	14.1	14.1	14.9	15.2	15.6	15.5	15.2	14.6	14.1	13.3	12.5	12.9	13.0	12.5	12.9	13.3	13.8
Yankton, S. Dak	6.5	6.0	6.1	6.4	6.1	5.5	5.3	5.8	6.8	8.0	9.1	10.2	11.0	11.4	12.1	11.8	12.1	11.0	9.4	7.3	7.7	7.4	7.1	7.4	8.2
West Indies.																									
Basseterre, St. Kitts	8.7	8.5	7.8	7.7	7.9	8.6	9.7	10.2	10.9	11.8	11.9	11.5	10.8	11.2	10.7	10.1	9.3	8.0	8.5	8.7	8.6	9.6	9.7	8.8	9.6
Bridgetown, Bar	4.6	4.7	5.0	4.6	4.4	4.6	5.9	8.0	9.0	10.0	10.4	10.5	10.1	9.5	8.5	7.9	6.5	5.1	5.3	5.3	5.9	5.9	4.2	4.4	6.7
Santo Domingo, S. D	2.8	2.6	2.8	2.9	3.0	2.9	3.0	3.3	3.4	4.0	4.2	4.5	4.8	4.9	4.8	4.6	4.3	3.7	3.3	3.3	3.3	3.1	2.9	2.9	3.5
Willemstad, Curaçao	7.1	6.9	6.9	6.6	6.0	5.7	6.8	9.1	10.2	11.2	11.8	11.1	10.6	10.5	10.6	10.6	11.6	10.7	10.0	9.4	8.7	8.0	7.4	7.4	9.0

TABLE VII.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of September, 1898.*

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	Hours.	Hours.	Hours.	°	Hours.
New England.						
Eastport, Me	19	17	8	27	n. 84 w.	19
Portland, Me	14	19	6	30	s. 78 w.	24
Northfield, Vt	11	42	3	12	s. 16 w.	32
Boston, Mass	13	17	7	32	s. 81 w.	25
Nantucket, Mass	17	18	14	29	s. 86 w.	15
Woods Hole, Mass.*	7	17	4	10	s. 31 w.	12
Block Island, R. I	12	20	12	34	s. 70 w.	23
New Haven, Conn	23	19	9	23	n. 74 w.	15
Middle Atlantic States.						
Albany, N. Y	13	36	8	10	s. 5 w.	23
Binghamton, N. Y.†	10	6	13	7	n. 56 e.	7
New York, N. Y	19	20	10	23	s. 86 w.	13
Harrisburg, Pa.†	7	5	8	15	n. 74 w.	7
Philadelphia, Pa	19	18	12	16	n. 76 w.	4
Atlantic City, N. J	17	20	16	23	s. 67 w.	8
Cape May, N. J	22	26	13	15	s. 27 w.	4
Baltimore, Md	22	20	12	23	n. 43 w.	16
Washington, D. C	18	21	14	18	s. 53 w.	5
Lynchburg, Va	20	13	25	20	n. 36 e.	9
Norfolk, Va	23	16	25	15	n. 35 e.	12
Richmond, Va	25	19	15	12	n. 27 e.	7
South Atlantic States.						
Charlotte, N. C	24	14	30	7	n. 67 e.	25
Hatteras, N. C	32	18	10	5	n. 20 e.	15
Raleigh, N. C	29	14	17	15	n. 8 e.	15
Wilmington, N. C	17	16	19	12	n. 82 e.	7
Charleston, S. C	20	18	27	9	n. 84 e.	18
Augusta, Ga	28	14	26	14	n. 41 e.	18
Savannah, Ga	22	17	28	6	n. 77 e.	23
Jacksonville, Fla	29	15	32	3	n. 64 e.	32
Florida Peninsula.						
Jupiter, Fla	22	14	33	7	n. 73 e.	27
Key West, Fla	16	9	38	7	n. 77 e.	32
Tampa, Fla	31	6	31	5	n. 46 e.	36
Eastern Gulf States.						
Atlanta, Ga	23	10	30	14	n. 51 e.	21
Pensacola, Fla	15	25	33	9	s. 67 e.	26
Mobile, Ala	27	13	23	4	n. 54 e.	24
Montgomery, Ala	18	14	36	10	n. 81 e.	26
Vicksburg, Miss	14	15	34	7	s. 88 e.	27
New Orleans, La	16	16	39	5	e.	34
Western Gulf States.						
Shreveport, La	17	22	35	6	s. 80 e.	29
Fort Smith, Ark	11	12	37	5	s. 88 e.	32
Little Rock, Ark	11	25	21	11	s. 36 e.	17
Corpus Christi, Tex	22	17	30	4	n. 79 e.	26
Fort Worth †	8	17	1	8	s. 38 w.	11
Galveston, Tex	23	20	30	5	n. 83 e.	25
Palestine, Tex	23	19	27	3	n. 81 e.	24
San Antonio, Tex	23	17	33	2	n. 79 e.	32
Ohio Valley and Tennessee.						
Chattanooga, Tenn	22	19	20	14	n. 63 e.	7
Knoxville, Tenn	25	19	16	13	n. 27 e.	7
Memphis, Tenn	15	24	22	17	s. 29 e.	10
Nashville, Tenn	17	20	17	19	s. 34 w.	4
Lexington, Ky	10	28	20	13	s. 21 e.	19
Louisville, Ky	17	25	20	15	s. 32 e.	19
Evansville, Ind.†	6	15	8	6	s. 13 e.	9
Indianapolis, Ind	12	31	13	17	s. 12 w.	19
Cincinnati, Ohio	11	24	24	18	s. 25 e.	14
Columbus, Ohio	13	21	14	17	s. 21 w.	8
Pittsburg, Pa	19	18	13	28	n 86 w.	15
Parkersburg, W. Va	16	24	20	14	s. 37 e.	10
Lower Lake Region.						
Buffalo, N. Y	13	27	4	27	s. 59 w.	27
Oswego, N. Y	11	34	13	19	s. 15 w.	24
Rochester, N. Y	5	34	8	31	s. 38 w.	37
Erie, Pa	12	30	5	25	s. 48 w.	27
Cleveland, Ohio	10	34	19	13	s. 14 e.	25
Sandusky, Ohio	10	26	12	23	s. 34 w.	19
Toledo, Ohio	12	26	9	27	s. 52 w.	23
Detroit, Mich	13	27	14	27	s. 27 w.	16
Upper Lake Region.						
Alpena, Mich	13	23	9	27	s. 61 w.	21
Grand Haven, Mich	21	20	16	18	n. 63 w.	2
Marquette, Mich	11	24	9	27	s. 54 w.	22
Port Huron, Mich	12	32	10	20	s. 27 w.	22
Sault Ste. Marie, Mich	16	13	20	24	n. 53 w.	5
Chicago, Ill	10	21	21	21	n.	11
Milwaukee, Wis	13	21	17	23	n. 34 w.	11
Green Bay, Wis	6	26	12	25	s. 33 w.	24
Upper Lake Region—Cont'd.						
Duluth, Minn	22	13	11	28	n. 62 w.	9
North Dakota.						
Moorhead, Minn	18	20	17	25	s. 76 w.	8
Bismarck, N. Dak	24	11	18	22	n. 17 w.	14
Williston, N. Dak	20	20	10	24	w.	14
Upper Mississippi Valley.						
St. Paul, Minn	14	24	17	23	s. 31 w.	12
La Crosse, Wis. †	7	21	5	7	s. 8 w.	14
Davenport, Iowa	17	18	19	17	s. 63 e.	2
Des Moines, Iowa	21	18	18	16	n. 34 e.	4
Dubuque, Iowa	16	24	13	21	s. 45 w.	11
Keokuk, Iowa	12	22	22	14	s. 39 e.	13
Cairo, Ill	10	31	22	6	s. 39 e.	22
Springfield, Ill	9	27	16	19	s. 9 w.	18
Hannibal, Mo. †	4	14	6	11	s. 27 w.	11
St. Louis, Mo	10	29	17	12	s. 15 e.	20
Missouri Valley.						
Columbia, Mo.*	4	13	10	9	s. 7 e.	8
Kansas City, Mo	15	27	22	13	s. 37 e.	15
Springfield, Mo	10	33	23	6	s. 36 e.	29
Lincoln, Nebr	18	28	20	8	s. 50 e.	16
Omaha, Nebr	19	25	17	12	s. 40 e.	8
Sioux City, Iowa†	11	10	10	6	n. 76 e.	4
Pierre, S. Dak	21	20	21	12	n. 84 w.	9
Huron, S. Dak	17	19	19	14	s. 68 e.	5
Yankton, S. Dak †	9	10	8	9	s. 45 w.	1
Northern Slope.						
Havre, Mont	18	15	9	36	n. 84 w.	27
Miles City, Mont	18	18	9	21	w.	12
Helena, Mont	10	24	12	32	s. 55 w.	24
Rapid City, S. Dak	16	14	10	35	n. 85 w.	25
Cheyenne, Wyo	25	14	11	27	n. 56 w.	19
Lander, Wyo	14	21	16	27	s. 58 w.	13
North Platte, Nebr	21	22	16	19	s. 72 w.	3
Middle Slope.						
Denver, Colo	17	29	19	6	s. 47 e.	18
Pueblo, Colo	19	12	25	16	n. 52 e.	11
Concordia, Kans	16	26	16	12	s. 22 e.	11
Dodge, Kans	17	27	15	13	s. 50 e.	16
Wichita, Kans	16	37	13	7	s. 29 e.	12
Oklahoma, Okla	15	33	12	5	s. 21 e.	19
Southern Slope.						
Abilene, Tex	13	34	18	8	s. 25 e.	23
Amarillo, Tex	13	33	9	14	s. 9 w.	20
Southern Plateau.						
El Paso, Tex	18	11	30	18	n. 60 e.	14
Santa Fe, N. Mex	19	22	22	15	s. 67 e.	8
Phenix, Ariz	18	5	24	24	n.	13
Yuma, Ariz	12	14	22	20	s. 45 e.	3
Independence, Cal	17	26	14	23	s. 45 w.	13
Middle Plateau.						
Carson City, Nev	12	24	8	29	s. 60 w.	24
Winnemucca, Nev	24	12	12	25	n. 47 w.	18
Salt Lake City, Utah	21	17	19	22	n. 37 w.	5
Northern Plateau.						
Baker City, Oreg	16	32	13	8	s. 17 e.	17
Idaho Falls, Idaho	20	34	1	9	s. 30 w.	16
Spokane, Wash	21	23	15	12	s. 56 e.	4
Walla Walla, Wash	14	37	6	13	s. 17 w.	24
North Pacific Coast Region.						
Fort Canby, Wash	24	19	17	13	n. 39 e.	6
Neah, Wash	1	8	20	36	s. 66 w.	18
Port Angeles, Wash.*	10	1	12	13	n. 6 w.	9
Seattle, Wash	22	20	13	15	n. 45 w.	3
Tacoma, Wash	29	18	3	21	n. 59 w.	21
Portland, Oreg	27	18	11	23	n. 53 w.	15
Roseburg, Oreg	32	10	16	15	n. 3 e.	22
Middle Pacific Coast Region.						
Eureka, Cal	21	21	9	24	w.	15
Red Bluff, Cal	21	24	10	10	s.	3
Sacramento, Cal	13	33	13	18	s. 14 w.	21
San Francisco, Cal	1	20	2	48	s. 68 w.	48
South Pacific Coast Region.						
Fresno, Cal	27	5	5	40	n. 58 w.	41
Los Angeles, Cal	4	15	2	48	s. 77 w.	47
San Diego, Cal	26	12	6	27	n. 56 w.	25
San Luis Obispo, Cal	22	10	3	29	n. 65 w.	20
West Indies.						
Basseterre, St. Kitts Island	9	19	36	7	s. 71 e.	31
Bridgetown, Barbados	23	8	42	0	n. 70 e.	45
Colon, U. S. C	9	41	14	10	s. 17 e.	32

*From observations at 8 p. m. only. †From observations at 8 a. m. only.

TABLE VIII.—*Thunderstorms and auroras, September, 1898.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	55	T.	2	5	2	4	1	3	3												2	2	1	1	1						1			28	13	T.
		A.																																0	0	A.
Arizona	56	T.	1	1			1	2	1	1	2	4																						13	8	T.
		A.																																0	0	A.
Arkansas	59	T.	1	1		3	1	11	1				1			2	12	7	3		1	4	3							1				52	15	T.
		A.																																0	0	A.
California	180	T.	3							1																		6	1			2		13	5	T.
		A.																																0	0	A.
Colorado	72	T.	7								3	4						6			1		1											22	6	T.
		A.																																0	0	A.
Connecticut	21	T.	7	12	4	1			10										1	7						1		7						50	9	T.
		A.									2																							2	1	A.
Delaware	5	T.							3																			4						7	2	T.
		A.																																0	0	A.
Dist. of Columbia	4	T.				1	1																											2	2	T.
		A.																																0	0	A.
Florida	45	T.	6	7	3	4	7	5	6	4	3	1	1					1	1	2	3	1	1	6	10	6	4	1	1	2		1		87	25	T.
		A.																																0	0	A.
Georgia	55	T.	3	3	7	8	6	1	3									1					1	5	1				1					40	12	T.
		A.																																0	0	A.
Idaho	38	T.	1																				1	5	1				1		1			10	6	T.
		A.		1							1		2	3	2																			9	5	A.
Illinois	86	T.			4	37	25	18	1	1					12	24	31	4	6				2	8	5	9	20			1	3	4		215	19	T.
		A.		7							1	1							1															10	4	A.
Indiana	57	T.	4	1	3	14	12	9							2	7	12	2	2					1		12	7	1			3			92	16	T.
		A.		3																														3	1	A.
Indian Territory	7	T.						1											2															3	2	T.
		A.																																0	0	A.
Iowa	120	T.	2	1	11	27	20	2		1					3		1						4	3	2	5	1	1		1	14	3		102	18	T.
		A.		9	1								1						1															12	4	A.
Kansas	85	T.		1	7	14	6	5		1	6	3	2	5		2	1	14	1		1	4												73	16	T.
		A.									1										1													2	2	A.
Kentucky	48	T.		3	4	12	5	4									7							3		1	2	4	5		2			52	12	T.
		A.																																0	0	A.
Louisiana	46	T.	7	12	4	3		2	3		1		4	5	4	2	2	2			3	3	1					1	1		3	5		68	20	T.
		A.																																0	0	A.
Maine	18	T.		7		8			6	1									1	2					1	1			1					28	9	T.
		A.								1	5		1				1	1	4															13	6	A.
Maryland	40	T.			3	5	5	1	11								1			1					1			15	1		1			45	11	T.
		A.		1					1		1																	1		1				5	5	A.
Massachusetts	59	T.	25	28	3	4	1		18	1							1	1	9	10								6	3					110	13	T.
		A.									7								2															9	2	A.
Michigan	104	T.	3	11	9	10	6	5	1		1				2	9	16	1	3	1		1		5	2	25		3			5	10		129	21	T.
		A.		10							1	3	1	1																				16	5	A.
Minnesota	67	T.	1	1	2	3				1				1		1							1	3	10	1					9			34	12	T.
		A.		9							4	1							1							1				1				17	6	A.
Mississippi	48	T.		4	1			4	3		1		1	3	2	1	7	2	1		2	1	1							1	1	1		37	18	T.
		A.																																0	0	A.
Missouri	95	T.			4	16	24	19					1		3	12	15	19	14			3	6	2	1	1	5		3	4	1			153	19	T.
		A.																																0	0	A.
Montana	40	T.	3	2	1																1			1										8	5	T.
		A.									1	3	5	4																				13	4	A.
Nebraska	144	T.		5	1	3	12	1			5	1			2		1	4													2			37	11	T.
		A.																																0	0	A.
Nevada	50	T.		1							1																	1	2		1			6	6	T.
		A.																																0	0	A.
New Hampshire	21	T.	3	12	5	3	1	1	11											11					6			2	2					57	11	T.
		A.								1	10	2							1											2				16	5	A.
New Jersey	51	T.	1	1	5	2	2	8	20											1								14						54	9	T.
		A.		1								1																						2	2	A.
New Mexico	34	T.					2		1		5	5						1				1							1					16	7	T.
		A.																																0	0	A.
New York	113	T.	4	20	13	23	3	30	7								1	2	2	29	1			1	17		1	14				1		169	17	T.
		A.		4	1						5	2	1			1			1		1													16	8	A.
North Carolina	57	T.	5	4	6	11	9	12	13		1							1				1	2	6	4	1			2	1				79	17	T.
		A.																																0	0	A.
North Dakota	52	T.	1	3	2	1																		1							2			10	6	T.
		A.		1						2	4	4	2					1	1	1						2				1				19	10	A.
Ohio	134	T.		15	8	42	22	20	3							1	25	2	16	14			2	3	6	33	3	13			10	5		243	19	T.
		A.		1		1		1			1	1																						5	5	A.
Oklahoma	21	T.	2					1				1	1					2	3		1	3												14	8	T.
		A.																																0	0	A.
Oregon	72	T.	2																	9	11	1	1	2	1					1	2	2		32	10	T.
		A.																																0	0	A.
Pennsylvania	105	T.		4	11	20	7	12	13	1							1	3	4	12	1				1			20	1					111	15	T.
		A.									3		1																					4	2	A.
Rhode Island	8	T.	5	5	1	2			3										1									2						19	7	T.
		A.									1	1																						2	2	A.
South Carolina	40	T.	3	3	4	9	7	10	8	2	1								2			2	1	6	2				3	1				64	16	T.
		A.																																0	0	A.
South Dakota	56	T.	1	1	3										2	1															4	1		13	7	T.
		A.		1							1	2	1		1		1								1									8	7	A.
Tennessee	59	T.	2	5	8	10	8	8	4								2	1	1			1	2	6	1					3				62	15	T.
		A.																																0	0	A.
Texas	89	T.	5	2	3			3	3	1	1					1	1		5	2	2		1	1			1							32	15	T.
		A.																																0	0	A.
Utah	38	T.									1																		2	2				5	3	T.
		A.											2	1																				3	2	A.
Vermont	14	T.	3	6	4	5		1	3								1	1		8					6	1								39	11	T.
		A.									2																							2	1	A.
Virginia	48	T.		1	1	10	6	3	3										1			1		2	1		6	3						38	12	T.
		A.																																0	0	A.
Washington	50	T.																		7	9		4	4			1	1	1	2	2			31	9	T.
		A.									5			2			1	1																9	4	A.
West Virginia	33	T.		2	5	9	5	6	1											1				1			3	1						34	10	T.
		A.		1																														1	1	A.
Wisconsin	60	T.	2	3	5	4	5								3	4	1		2					4	4	10					5	4		56	14	T.
		A.	1	10	1		1	1		1	4	6	1	1		1	1	3																32	13	A.
Wyoming	17	T.	1																											1				2	2	T.
		A.									2	1	3	2																				8	4	A.
Sums	2,871	T.	116	193	157	328	210	208	163	16	32	19	11	14	35	67	139	77	81	117	39	29	36	80	84	107	54	120	32	21	72	39	....	2,696	....	T.
		A.	1	59	3	1	1	2	1	5	62	28	21	14	3	2	4	6	12	1	2	0	0	0	1	3	0	1	0	5	0	0	....	238	....	A.

TABLE IX.—*Average hourly sunshine (in percentages), September, 1898.*

Stations.	Instrument.	A. M. 5	6	7	8	9	10	11	Noon	P. M. 1	2	3	4	5	6	7	8	Hours of sunshine. Total. Actual.	Possible.	Percent of possible.	Personal estimate.
																		Hours.	Hours.		
Albany, N. Y	T.	......	26	34	42	58	70	78	82	82	83	75	65	60	50	52	......	239.1	375.0	64	58
Atlanta, Ga	T.	......	27	37	37	37	44	47	48	49	40	35	30	27	29	9	......	140.0	371.8	38	35
Atlantic City, N. J	P.	......	74	70	72	71	74	76	72	76	76	78	74	72	69	82	......	273.8	373.4	73	65
Baltimore, Md	T.	......	63	58	70	80	88	91	95	97	92	85	83	74	52	53	......	297.8	373.4	80	67
Binghamton, N. Y	T.	......	9	11	32	57	70	75	78	72	72	69	62	55	36	17	......	208.3	374.5	56	52
Bismarck, N. Dak	P.	......	51	49	57	59	71	72	72	67	75	72	66	66	67	67	......	246.9	376.9	65	62
Boston, Mass	T.	......	50	59	65	70	75	84	89	91	88	78	67	53	49	32	......	266.2	374.5	71	63
Buffalo, N. Y	T.	......	48	51	61	74	80	88	92	96	94	85	85	75	61	56	......	290.0	375.0	77	53
Charleston, S. C	T.	......	23	30	37	53	61	51	70	64	62	64	62	50	25	11	......	190.9	371.4	51	49
Chattanooga, Tenn	T.	......	27	28	34	54	54	56	65	64	59	51	49	43	32	19	......	179.8	372.0	48	48
Cheyenne, Wyo	P.	......	55	63	83	87	84	90	89	84	82	79	74	67	53	71	......	289.0	374.0	77	67
Chicago, Ill	T.	......	37	29	45	56	68	69	78	76	74	67	62	46	37	47	......	218.3	374.5	58	58
Cincinnati, Ohio	T.	......	61	57	59	64	76	80	88	91	93	89	84	78	72	71	......	287.9	373.4	77	68
Cleveland, Ohio	T.	......	47	47	50	49	63	69	68	77	79	81	64	53	46	49	......	231.2	374.5	62	52
Columbia, Mo	T.	......	48	47	55	67	76	79	83	82	81	72	73	70	64	65	......	262.2	373.4	70	51
Columbus, Ohio	T.	......	54	56	60	71	77	79	81	81	84	82	72	68	67	82	......	271.6	373.6	73	64
Denver, Colo	P.	......	77	75	74	80	83	85	85	89	88	83	80	75	54	55	......	294.8	373.6	79	66
Des Moines, Iowa	T.	......	48	55	59	74	80	76	77	77	76	70	60	58	63	58	......	254.8	374.5	68	59
Detroit, Mich	T.	......	49	47	57	75	81	85	86	86	82	81	74	61	36	51	......	262.7	374.5	70	59
Dodge, Kans	P.	......	67	72	74	77	79	83	85	83	83	83	82	81	73	75	......	296.0	373.0	79	64
Dubuque, Iowa	T.	......	35	36	53	77	83	85	86	87	91	89	85	67	51	37	......	272.0	374.5	73	64
Eastport, Me	P.	......	24	29	43	57	63	59	63	69	68	62	50	46	35	25	......	197.1	375.8	52	34
Erie, Pa	T.	......	50	51	58	65	73	78	83	77	79	81	79	68	55	47	......	261.3	374.5	70	55
Eureka, Cal	P	......	11	13	19	24	34	42	37	52	47	45	51	49	42	50	......	140.2	374.0	37	36
Fresno, Cal	T.	......	90	80	80	86	89	89	90	93	89	89	88	87	88	100	......	326.6	372.6	88	86
Galveston, Tex	P.	......	13	33	54	64	73	71	76	68	71	72	71	58	43	18	......	227.1	370.4	61	48
Harrisburg, Pa	T.	......	65	52	67	76	81	83	80	86	84	75	70	59	38	50	......	263.6	373.6	71	58
Helena, Mont	T.	......	49	57	72	80	79	77	69	65	75	72	70	65	32	10	......	249.7	376.9	66	57
Huron, S. Dak	T.	......	64	66	68	66	77	79	83	80	78	70	66	61	56	48	......	264.2	375.4	70	62
Idaho Falls, Idaho*	T.	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Indianapolis, Ind	T.	......	52	50	52	60	62	67	72	78	77	69	65	60	56	59	......	237.5	373.6	64	49
Jacksonville, Fla	T.	......	10	17	53	71	76	82	75	71	68	61	61	45	17	2	......	209.6	370.8	57	43
Kansas City, Mo	P.	......	61	60	70	71	76	74	69	64	72	77	81	70	61	58	......	261.5	373.4	70	64
Key West, Fla	T.	......	41	44	57	81	89	90	88	89	87	86	79	64	46	31	......	273.4	369.0	74	46
Knoxville, Tenn	T.	......	22	24	44	60	69	67	77	84	70	67	60	53	40	25	......	217.2	372.2	58	53
Little Rock, Ark	T.	......	63	60	59	64	67	72	75	75	75	69	66	63	62	69	......	249.8	372.0	67	51
Los Angeles, Cal	P.	......	75	66	66	68	72	78	82	85	90	91	91	95	94	100	......	302.9	371.8	81	76
Louisville, Ky	T.	......	62	61	63	74	81	80	84	77	77	79	72	63	58	53	......	266.8	373.0	72	53
Minneapolis, Minn	T.	......	50	55	63	76	77	72	73	72	69	64	62	53	41	38	......	239.9	375.8	64	......
Nashville, Tenn	T.	......	70	71	81	87	92	97	93	90	88	85	81	72	52	56	......	304.6	372.2	82	65
New Orleans, La	T.	......	54	50	47	52	55	56	46	41	46	37	37	28	24	20	......	160.4	370.8	43	46
New York, N. Y	T.	......	14	37	59	64	73	76	81	80	78	74	65	58	45	45	......	240.8	374.0	64	61
Northfield, Vt	P.	......	41	34	51	57	64	71	64	61	61	57	56	46	30	24	......	201.1	375.4	54	41
Oklahoma, Okla	T.	......	71	75	80	83	85	90	88	90	87	86	84	77	69	71	......	306.7	372.0	82	78
Omaha, Nebr	P.	......	66	70	70	75	72	78	76	74	71	70	64	71	66	55	......	265.5	374.0	71	70
Parkersburg, W. Va	T.	......	52	57	58	65	74	78	76	80	80	71	59	54	43	44	......	244.8	373.4	66	64
Philadelphia, Pa	T.	......	64	59	65	69	75	78	83	84	83	75	66	59	57	68	......	264.8	373.6	71	66
Phenix, Ariz	P.	......	88	92	98	99	100	100	99	100	100	100	100	100	97	91	......	365.6	371.4	98	96
Pittsburg, Pa	T.	......	27	29	37	49	58	69	77	85	83	77	73	66	59	62	......	234.1	374.0	63	55
Portland, Me	T.	......	12	27	56	68	78	80	87	83	82	77	65	53	41	20	......	241.2	375.4	64	58
Portland, Oreg	T.	......	40	34	40	45	52	70	80	73	80	69	61	50	55	71	......	220.7	376.1	59	56
Raleigh, N. C	T.	......	23	31	49	66	78	84	81	83	81	71	69	58	42	31	......	240.8	372.2	65	56
Rochester, N. Y	T.	......	47	47	49	58	64	71	72	74	79	71	61	49	62	75	......	235.5	375.0	63	58
St. Louis, Mo	T.	......	57	55	64	70	76	83	88	90	88	83	77	74	55	56	......	278.6	373.4	75	58
St. Paul, Minn	P.	......	62	58	66	74	76	73	71	64	64	63	58	44	39	34	......	232.9	375.8	62	57
Salt Lake City, Utah	P.	......	82	86	91	93	93	95	97	95	94	96	90	90	85	95	......	343.6	374.0	92	75
San Diego, Cal	P.	......	54	49	61	71	78	86	93	96	95	95	94	91	88	93	......	306.5	371.4	83	81
San Francisco, Cal	T.	......	20	27	33	55	75	90	96	97	96	98	91	74	48	58	......	268.6	373.0	72	55
Santa Fe, N. Mex	P.	......	86	89	88	92	93	91	89	85	89	92	92	91	90	79	......	334.1	372.2	90	79
Savannah, Ga.*	T.	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Seattle, Wash	T.	......	25	20	20	23	33	51	59	62	67	50	41	34	34	51	......	154.3	377.5	41	49
Spokane, Wash	T.	......	73	64	69	73	78	77	79	74	68	76	70	61	58	78	......	268.0	377.5	71	62
Tacoma, Wash	T.	......	20	17	29	42	64	70	75	79	78	68	59	51	46	67	......	210.0	376.9	56	50
Tampa, Fla	T.	......	73	75	77	81	83	88	80	76	77	66	52	36	31	14	......	251.2	369.6	68	63
Topeka, Kans	T.	......	59	67	72	82	80	77	73	81	78	76	75	70	63	71	......	276.8	373.4	74	......
Vicksburg, Miss	T.	......	39	40	35	33	44	50	48	51	56	51	53	40	35	36	......	165.5	371.4	45	45
Washington, D. C	P.	......	66	61	68	70	76	80	82	89	85	78	76	78	79	80	......	286.2	373.4	77	65
Wilmington, N. C	T.	......	44	38	61	79	79	82	82	84	78	70	56	39	19	11	......	233.9	371.8	63	51
Yankton, S. Dak	T.	......	38	53	76	81	94	95	91	90	92	93	89	86	69	54	......	308.8	375.0	82	57
Bridgetown, Barbados	T.	......	29	31	33	41	46	49	54	55	46	36	18	10	9	4	......	130.3	366.0	36	33

* Self-register out of order.

TABLE X.—*Accumulated amounts of precipitation for each* 5 *minutes, for storms in which the rate of fall equaled or exceeded* 0.25 *in any* 5 *minutes, or* 0.75 *in* 1 *hour during September,* 1898, *at all stations furnished with self-registering gauges.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total am't of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	7	12.10 p.m.	12.55 p.m.	0.47	12.20 p.m.	12.33 p.m.	T.	0.32	0.39	0.45	0.46	0.47									
Atlanta, Ga.	1-2			3.26														0.67			
Atlantic City, N. J.	22-23	9.30 p.m.	6.00 a.m.	1.14	4.40 a.m.	5.20 a.m.	0.35	0.18	0.27	0.33	0.40	0.47	0.52	0.60	0.65	0.69	0.73				
Baltimore, Md.	22-23			1.10														0.44			
Binghamton, N. Y.	4	3.45 p.m.	4.51 p.m.	0.90	4.03 p.m.	4.25 p.m.	0.02	0.24	0.54	0.74	0.81	0.86									
Do	6	6.22 p.m.	7.05 p.m.	1.01	6.25 p.m.	6.55 p.m.	T.	0.16	0.30	0.49	0.68	0.84	0.99								
Bismarck, N. Dak.	2			0.32														0.31			
Boston, Mass.	7	5.00 p.m.	7.30 p.m.	0.55	6.50 p.m.	7.00 p.m.	0.03	0.20	0.36												
Buffalo, N. Y.	5	7.25 a.m.	10.10 a.m.	0.70	8.05 a.m.	8.25 a.m.	0.03	0.12	0.32	0.46	0.52										
Cairo, Ill.	5	3.50 p.m.	5.40 p.m.	0.53	4.44 p.m.	5.04 p.m.	0.06	0.17	0.35	0.45	0.47										
Charleston, S. C.	3	1.02 p.m.	1.54 p.m.	0.42	1.02 p.m.	1.16 p.m.	0.00	0.17	0.32	0.42											
Chicago, Ill.*																					
Cincinnati, Ohio	24	7.50 p.m.	11.45 p.m.	0.45	8.05 p.m.	8.25 p.m.	0.07	0.24	0.34	0.42											
Cleveland, Ohio	17-18			0.66														0.47			
Columbia, Mo.	5-6	11.00 p.m.	D. N.	0.82	11.02 p.m.	11.15 p.m.	0.01	0.16	0.36	0.40	0.41	0.41	0.41	0.44	0.52	0.57	0.64	0.70			
Columbus, Ohio	22			1.12														0.35			
Denver, Colo.	16			0.13														0.12			
Des Moines, Iowa*																					
Detroit, Mich.	6	5.20 a.m.	10.00 a.m.	0.84	6.45 a.m.	7.17 a.m.	0.05	0.05	0.10	0.18	0.30	0.43	0.63	0.73							
Dodge, Kans	16	1.43 p.m.	3.23 p.m.	0.94	1.50 p.m.	2.40 p.m.	0.05	0.15	0.30	0.32	0.33	0.34	0.35	0.40	0.60	0.75	0.82				
Duluth, Minn.	29			0.18														0.17			
Eastport, Me.	23			0.79														0.41			
Erie, Pa.	6	8.53 a.m.	9.45 a.m.	0.52	9.00 a.m.	9.25 a.m.	T.	0.14	0.22	0.30	0.39	0.50									
Fresno, Cal.	25-26			0.90														0.34			
Galveston, Tex.	17	5.03 p.m.	11.26 p.m.	4.26	6.45 p.m.	7.55 p.m.	0.42	0.10	0.39	0.82	1.32	1.50	1.92	2.39	2.66	2.82	2.95	3.21	3.43	3.62	3.71
Hannibal, Mo.	4	4.35 p.m.	6.10 p.m.	1.13	5.16 p.m.	5.32 p.m.	0.04	0.08	0.51	0.98	1.02										
Do	5-6	10.00 p.m.	D. N.	1.26	10.20 p.m.	10.50 p.m.	0.10	0.13	0.36	0.64	0.74	0.79	0.85	0.89							
Do	25	6.35 a.m.	8.10 a.m.	1.55	6.38 a.m.	7.20 a.m.	0.01	0.23	0.55	0.87	1.00	1.03	1.06	1.10	1.29	1.32					
Harrisburg, Pa.	26	11.35 a.m.	3.35 p.m.	1.35	12.35 p.m.	12.55 p.m.	0.01	0.17	0.42	0.52	0.58										
Hatteras, N. C.	23			0.45														0.32			
Huron, S. Dak.	18			0.61														0.27			
Idaho Falls, Idaho	1			0.02														0.02			
Indianapolis, Ind.	24	6.05 p.m.	7.59 p.m.	1.16	6.13 p.m.	6.28 p.m.	0.01	0.34	0.61	0.78											
Jacksonville, Fla.	8	11.50 a.m.	2.30 p.m.	0.97	11.57 a.m.	12.27 p.m.	0.02	0.08	0.24	0.45	0.57	0.65	0.71	0.75							
Jupiter, Fla.	26-27	7.10 p.m.	7.00 a.m.	1.07	9.10 p.m.	9.24 p.m.	0.17	0.06	0.30	0.53											
Kansas City, Mo.	5	9.53 p.m.	11.05 p.m.	1.40	10.00 p.m.	10.40 p.m.	T.	0.06	0.29	0.69	0.87	0.92	1.02	1.20	1.29						
Key West, Fla.	1-2	9.10 p.m.	6.35 a.m.	0.81	1.50 a.m.	2.15 a.m.	0.18	0.08	0.36	0.53	0.56	0.72									
Do	22	9.10 p.m.	10.05 p.m.	0.72	9.15 p.m.	9.35 p.m.	0.04	0.12	0.38	0.52	0.58										
Knoxville, Tenn.	2-3	6.45 p.m.	D. N.	5.07	11.30 p.m.	12.20 a.m.	0.61	0.06	0.19	0.22	0.39	0.59	0.67	0.73	0.85	0.93	1.02				
					12.20 a.m.	1.10 a.m.		1.10	1.20	1.24	1.28	1.33	1.41	1.45	1.54	1.74	1.94				
					1.10 a.m.	2.00 a.m.		2.08	2.18	2.21	2.30	2.48	2.65	2.73	2.91	3.05	3.17				
					2.00 a.m.	2.50 a.m.		3.33	3.46	3.57	3.69	3.78	3.86	3.95	4.08	4.14	4.20	4.24	4.37	4.46	
Do.	22	D. N.	12.25 p.m.	0.99	10.18 a.m.	10.45 a.m.	0.24	0.24	0.35	0.38	0.46	0.50	0.56	0.58							
Lincoln, Nebr.	12			1.00														0.13			
Little Rock, Ark.	12	2.20 p.m.	11.20 p.m.	3.32	7.40 p.m.	9.20 p.m.	1.66	0.06	0.20	0.28	0.33	0.37	0.41	0.47	0.51	0.59	0.73	1.00	1.27	1.45	1.51
Do.	15	8.15 a.m.	12.12 p.m.	2.01	8.30 a.m.	9.05 a.m.	0.06	0.36	0.69	0.85	1.08	1.27	1.53	1.62	1.66	1.68					
Los Angeles, Cal.	27			0.01																	
Louisville, Ky.	21-22			1.29														0.32			
Memphis, Tenn.	6	9.33 p.m.	10.05 p.m.	0.67	9.33 p.m.	9.57 p.m.	0.00	0.10	0.16	0.31	0.43	0.66	0.67								
Milwaukee, Wis.	22			0.54														0.19			
Montgomery, Ala.	10			0.16								0.14									
Nantucket, Mass.	23			0.42														0.20			
Nashville, Tenn.	21-22	12.28 p.m.	3.00 a.m.	1.85	10.30 p.m.	11.35 p.m.	0.78	0.05	0.11	0.17	0.21	0.26	0.36	0.41	0.50	0.55	0.58	0.69	0.81		
New Orleans, La.	9-10	10.45 p.m.	11.30 a.m.	2.41	4.45 a.m.	6.00 a.m.	0.60	0.26	0.39	0.56	0.76	0.98	1.04	1.09	1.12	1.13	1.17	1.46	1.74	1.84	
Do.	29	8.20 a.m.	2.15 p.m.	1.51	9.32 a.m.	10.07 a.m.	0.02	0.17	0.30	0.43	0.62	0.69	0.82	1.00	1.02	1.05					
New York, N. Y.	22-23			0.93														0.39			
Norfolk, Va.	7	9.20 p.m.	11.50 p.m.	0.97	9.50 p.m.	10.20 p.m.	0.04	0.09	0.18	0.25	0.43	0.66	0.85	0.87	0.89						
Do.	23	1.30 a.m.	11.45 a.m.	1.97	6.00 a.m.	7.40 a.m.	0.30	0.08	0.17	0.25	0.33	0.40	0.47	0.55	0.63	0.71	0.78	0.92	1.14	1.30	
Northfield, Vt.	22-23			1.00														0.24			
Oklahoma, Okla.	6			0.71														0.25			
Omaha, Nebr.	5			0.63														0.49			
Parkersburg, W. Va.	7	D. N.	D. N.	0.76	3.20 a.m.	3.45 a.m.	0.02	0.17	0.33	0.43	0.53	0.61									
Philadelphia, Pa.	22-23			1.01							0.28										
Pittsburg, Pa.	7			0.24														0.12			
Portland, Me.	23			1.11														0.45			
Portland, Oreg.	20-21			1.23														0.33			
Raleigh, N. C.*																					
Richmond, Va.	22-23	10.18 a.m.	7.35 a.m.	1.88	1.23 a.m.	2.00 a.m.	0.75	0.22	0.38	0.52	0.60	0.66	0.80	0.95	1.00	1.02	1.04				
Rochester, N. Y.	6	11.55 a.m.	1.10 p.m.	1.35	12.14 p.m.	12.23 p.m.	0.05	0.40	0.67	0.69											
St. Louis, Mo.	25	9.25 a.m.	11.05 a.m.	0.61	9.30 a.m.	9.50 a.m.	T.	0.14	0.31	0.45	0.49	0.50	0.52	0.54	0.56						
St. Paul, Minn.	13			0.21														0.13			
Salt Lake City, Utah	28			0.13														0.07			
San Diego, Cal.	27			0.06																	
San Francisco, Cal.	24-25			0.73														0.21			
Savannah, Ga.	4	2.44 p.m.	4.10 p.m.	1.84	2.45 p.m.	3.30 p.m.	T.	0.16	0.37	0.52	0.84	1.08	1.44	1.65	1.77	1.82					
Do.	8	5.58 p.m.	D. N.	1.34	6.30 p.m.	7.15 p.m.	0.01	0.10	0.26	0.43	0.54	0.67	0.87	0.97	1.04	1.12	1.14	1.18			
Seattle, Wash.	22			0.90														0.34			
Spokane, Wash.	27			0.15														0.11			
Tampa, Fla.	5	2.25 p.m.	6.40 p.m.	0.93	2.25 p.m.	2.43 p.m.	0.00	0.16	0.44	0.68	0.81										
Do.	25	4.45 p.m.	10.10 p.m.	2.44	4.45 p.m.	5.12 p.m.	0.00	0.10	0.35	0.70	0.79	0.96	1.01								
Do.	26	4.00 p.m.	4.40 p.m.	0.77	4.00 p.m.	4.25 p.m.	0.00	0.05	0.34	0.50	0.63	0.72	0.75								
Vicksburg, Miss.	12-13	8.30 p.m.	2.15 a.m.	2.07	8.35 p.m.	9.05 p.m.	T.	0.06	0.26	0.59	1.06	1.37	1.47	1.49	1.55	1.56	1.57	1.68			
Washington, D. C.	22-23			0.69														0.18			
Wilmington, N. C.	21-22			0.59														0.36			
Yankton, S. Dak.	13			1.04														0.67			
Basseterre, St. Kitts	12	7.55 a.m.	D. N.	3.63	6.20 p.m.	7.10 p.m.	1.17	0.07	0.16	0.29	0.44	0.71	0.76	0.85	0.94	0.97	1.00				
					7.10 p.m.	7.55 p.m.		1.02	1.11	1.20	1.24	1.36	1.61	1.95	2.05	2.27	2.31	2.36			
Do	13-14	4.40 a.m.	D. N.	4.01	5.40 p.m.	6.00 p.m.	1.82	0.18	0.39	0.69	1.11										
Do	20	1.45 p.m.	7.16 p.m.	1.70	3.50 p.m.	4.15 p.m.	0.07	0.19	0.63	1.03	1.26	1.41									
Bridgetown, Barbados	8	9.20 a.m.	1.30 p.m.	0.76	12.09 p.m.	12.25 p.m.	0.24	0.19	0.37	0.45											
Do	10-12	†	†	11.64	6.00 a.m.	7.10 a.m.		0.13	0.36	0.40	0.47	0.67	0.89	0.94	1.25	1.43	1.59	1.82	1.98		
Do	20-21	9.00 p.m.	6.15 a.m.	3.00	1.00 a.m.	1.50 a.m.	0.11	0.11	0.21	0.32	0.40	0.46	0.57	0.64	0.72	0.81	0.93				
					1.50 a.m.	2.40 a.m.		1.09	1.24	1.35	1.60	1.90	2.16	2.29	2.42	2.58	2.68	2.70			
Santo Domingo, S. D.	17	12.20 a.m.	6.30 a.m.	1.11	12.25 a.m.	12.50 a.m.	T.	0.09	0.40	0.54	0.59	0.73	0.76	0.79	0.82						
Willemstad, Curaçao	9	8.41 p.m.	10.45 p.m.	1.29	8.45 p.m.	9.10 p.m.	0.01	0.16	0.25	0.36	0.46	0.56	0.58	0.58	0.58	0.58	0.65	0.73	1.01	1.15	1.28

*Self-register out of order.

† Rain began at 1:15 p. m. of 10th and continued at irregular intervals to 10:30 a. m. of 12th. The record during the greater part of the time was incomplete, due to the self-register having been blown down. Heavy rain fell from 8 p. m. of the 10th to about 2 a. m. of the 11th, during which time it is estimated that 4.00 inches fell. The rain continued with irregular showers of varying intensity to about 6 a. m. of the 12th, when heavy rain again began, continuing about one hour, during which time nearly 2.00 inches fell, after which light rain continued to 10:30 a. m. The five-minute values given are from 6 a. m. to 7:10 a. m. of the 12th.

TABLE XI.—*Excessive precipitation, by stations, for September*, 1898.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
Daphne	14.86	3.00	30			
Mobile	16.40	5.38	20-21			
Do		5.00	29-30			
Arkansas.						
Beebranch		3.45	21			
Corning	11.08	2.71	11-12			
Do		5.43	28-30			
Fayetteville		2.65	12			
Fort Smith		3.07	11-12			
Hardy		2.66	21			
Hot Springs				1.65	1 00	15
Jonesboro		4.23	29-30			
Keesees Ferry		2.86	20-21			
Little Rock	10.23	3.52	11-12	1.16	1 05	12
Do				1.63	0 35	15
Lonoke		3.50	12			
Mena		3.24	12			
Mossville	10.50	3.41	11-12			
Mount Nebo		2.78	12			
Newport	14.19	4.44	12-13			
Ozark		2.75	12			
Pocahontas	11.34	4.34	12-13			
Do		3.25	29-30			
Pond		5.00	11-12			
Rison	11.75	3.00	12			
Do		3.00	20			
Silver Springs		2.50	11-12			
Warren		2.77	20-21			
Do		2.53	29-30			
Washington				1.96	1 30	6-7
Florida.						
Bartow		2.64	25			
Carrabelle		2.80	9			
Eustis		3.26	24			
Fort Meade		3.60	23			
Manatee	10.37					
Myers	10.73					
Pensacola	17.93	2.66	21	1.16	1 00	21
Do		11.35	28-30	1.31	1 00	29
Sebastian		4.43	21			
Tampa		3.21	25-26	1.00	0 28	25
Tarpon Springs	13.12	4.73	6	4.73	3 00	6
Do				1.44	0 50	20
Georgia.						
Adairsville		3.67	2			
Atlanta		3.26	1-2			
Canton		4.25	1-2			
Cartersville		4.20	1			
Clayton	11.34	4.70	2			
Dahlonega	12.08	9.46	1-3			
Diamond		4.47	2			
Elberton		2.68	2			
Gainesville		3.70	2			
Gillsville	10.13	6.61	1-2			
Greenbush	10.82	5.00	2			
Louisville		4.61	1			
Macon		3.10	7-8			
Marietta		6.07	1-3			
Millen		6.40	*			
Ramsey		3.69	2			
Rome		2.80	7			
Thomasville				1.46	0 59	23
Toccoa	11.98	4.30	1-2			
Waynesboro		4.65	*			
Illinois.						
Cairo		4.58	†			
Coatesburg		2.62	22			
Cobden				1.06	0 28	5
Decatur		2.54	4			
Henry		2.75	21-22			
Laharpe		2.50	22			
Palestine		3.39	25			
Philo				1.91	1 00	4
Robinson	10.09	5.10	25			
Indiana.						
Angola				2.00	1 30	24
Bright				2.00	2 00	22
Greensburg		3.41	24-25			
Indianapolis				1.14	1 06	24
Rockville		3.00	4			
Shelbyville		3.15	24			
Terre Haute		3.11	4-5			
Warsaw		2.50	6			
Washington		3.37	24			
Indian Territory.						
Webbers Falls		5.91	10-11			
Iowa.						
Belleplaine		3.50	5			
Carroll				2.14	1 40	4
Keokuk		2.89	4-5			
Toledo		2.73	4			
Webster City				1.00	1 00	4
Kansas.						
Altoona		5.83	11-12			
Burlington		2.68	12			
Chanute		6.06	10-12			
Dresden		3.43	11-12			
Fanning		4.71	5			
Fort Scott		2.90	12			
Independence		3.96	11			

TABLE XI.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Kansas—Continued.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
Lebo		3.51	12			
Macksville				1.36	0 30	16
Morantown		2.85	12			
Oberlin		2.70	12			
Osage City		2.90	12			
Sedan		3.38	12			
Topeka		2.62	11-12			
Toronto		3.41	12			
Kentucky.						
Blandville		4.08	29-30			
Carrollton		2.60	4			
Eubank		2.70	27			
Shelby City				2.40	0 50	27
Louisiana.						
Abbeville		2.80	19-20			
Do		4.20	28-29			
Alexandria		2.97	29-30			
Amite		2.65	19-20			
Baton Rouge		4.04	19			
Cheneyville	10.10	7.50	30			
Clinton		3.08	20			
Do		2.66	29			
Como	11.63	5.20	19-20			
Do		2.99	29-30			
Covington	14.65	5.90	29-30			
Donaldsonville	14.20	2.85	11			
Do		6.25	19-20			
Do		2.50	29			
Elm Hall	15.65	3.20	11			
Do		5.35	19			
Emilie	16.42	4.92	10-11			
Do		7.56	19-20			
Franklin	17.46	8.02	19			
Do		5.33	29			
Grand Coteau		4.96	28-29			
Hammond	11.65	4.36	20			
Do		4.20	29			
Houma	18.70	9.30	9-12			
Do		5.60	28-30			
Jeanerette	15.06	5.35	18-19			
Do		6.36	28-29			
Jennings	13.85	9.05	28-29			
Lafayette	12.20	2.83	20			
Do		5.55	29-30			
Lake Providence		2.95	20			
Lawrence	15.29	8.25	9-11			
Mansfield		3.30	12			
Melville		3.10	20-21			
Do		3.65	29-30			
Monroe		2.60	30			
New Iberia		3.75	19			
New Orleans	13.90	3.01	9-10	1.60	1 05	10
Do		2.77	11-12			
Paincourtville	17.59	8.30	19-20			
Do		2.96	28-29			
Plaquemine	10.74	4.19	20			
Port Eads	18.44	4.75	9-10			
Do		3.92	27-28			
Rayne	14.90	8.31	30			
Schriever	11.57					
Shellbeach	11.00	2.60	19			
Do		7.02	28-29			
Shreveport		4.14	11-12			
Southern University	15.00	3.00	9			
Sugar Experiment Station	19.55	10.72	9-11			
Do		2.93	29			
Venice	14.47	5.27	9-10			
Do		2.85	28			
Wallace	16.81	3.87	11			
Do		6.93	19-20			
Do		3.95	28-29			
White Sulphur Springs	13.75	6.25	12			
Do		3.50	19-20			
Do		3.75	28-29			
Maryland.						
Jewell		2.50	22-23			
Michigan.						
Alma		2.58	22-23			
Mount Clemens		2.70	6			
South Haven		2.92	15			
Mississippi.						
Agricultural College		5.00	20-21			
Bay St. Louis	12.88	3.68	11			
Do		2.77	29			
Biloxi	21.76	5.02	20-21			
Do		6.75	29-30			
Briers		2.91	20			
Columbus		2.57	21			
Edwards		3.50	20			
Fayette		4.25	20-21			
Greenville		2.70	20-21			
Leakesville		3.45	28-29			
Logtown	17.65	2.90	9-10			
Do		4.93	28-29			
Louisville		2.57	21			
Macon		4.20	21			
Magnolia		2.62	19-20			
Do		3.35	28-29			
Natchez		2.65	21			

TABLE XI.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Mississippi—Continued.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Port Gibson		4.48	20-21			
Vicksburg		3.90	19-20	1.42	0 25	12
Missouri.						
Appleton City		2.60	10-11			
Arthur		3.35	10-11			
Bethany				1.35	1 00	5
Bolckow		3.00	5			
Carrollton		3.00	6-7			
Cowgill		3.28	12			
Fairport	10.50	6.85	4-5			
Gallatin		4.73	4-5			
Halfway		2.65	12			
Hannibal				1.02	0 18	4
Do				1.00	0 55	5
Do				1.31	0 43	25
Houstonia		2.80	5-6			
Do		3.01	12			
Irena		2.95	5			
Kansas City				1.29	0 37	5
Kidder		3.06	5-6			
Lamar		2.50	10-11			
Lamonte		3.65	11-12			
Lexington		2.78	6			
Do		2.53	12			
Liberty		2.72	6			
Marshall		2.50	12			
Maryville		3.38	5-6			
Neosho		4.50	10-11			
Nevada		3.12	10-11			
New Madrid		4.18	29-30			
Olden		3.01	21			
Oregon	10.01	3.07	5			
Osceola	10.72	8.00	11-12			
Platte River		2.88	5			
Poplar Bluff	10.20	3.20	30			
Princeton		2.63	5			
Do		2.89	11-12			
St. Joseph		3.30	4-5			
Sarcoxie		3.80	10-11			
Springfield		2.88	11-12			
Stellada		2.81	16			
Sublett	14.67	5.00	4-5			
Do		4.10	12-13			
Wheatland		5.72	10-12			
Nebraska.						
Culbertson		2.73	11			
Dawson		3.70	5	2.95	1 15	5
Eden		2.50	5			
Fairbury				1.25	1 00	5
Holdrege				1.50	0 20	12
Imperial		3.32	11			
Redcloud		2.55	9-10			
Rulo		5.39	5-6	1.49	1 00	5
Do				3.90	2 30	6
Salem		3.10	6			
Stratton		2.75	11			
Tablerock		3.20	5	3.20	2 00	5
Wauneta		3.04	10			
New Hampshire.						
Concord		2.95	23-24	1.52	1 00	23
Hanover		2.70	24			
Stratford		2.70	23-24			
New Jersey.						
Plainfield				1.08	0 15	7
Toms River		2.56	22-23			
New York.						
Auburn		3.25	6-7			
Binghamton				1.01	0 35	6
Catskill				1.40	1 00	7
Dekalb Junction		2.61	7			
Fleming				1.10	1 00	6
Ithaca				1.20	0 30	6
North Carolina.						
Abshers		7.01	22-23			
Biltmore		3.26	21			
Bryson City		4.95	23			
Chapelhill		3.00	22-23			
Flatrock		5.75	22			
Hendersonville		2.96	22			
Horsecove		4.58	21-22			
Lenoir		6.00	21-22			
Linville		7.57	22-23			
Louisburg		2.90	23	2.90	2 00	23

TABLE XI.—*Excessive precipitation.*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
North Carolina—Continued.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Lumberton		3.80	8-9			
Mana		2.82	22			
Marion		6.78	21-22			
Monroe		2.50	7-8			
Morganton		3.25	22			
Mountairy		6.02	22			
Murphy		5.73	2-3			
Oakridge		2.79	22-23			
Pantego		2.60	23			
Patterson		8.00	22			
Saxon		3.88	22			
Ohio.						
Bellefontaine				1.00	0 50	25
Cleveland (*a*)				1.05	0 45	6
Killbuck				1.95	1 30	4
Montpelier				1.50	0 40	24
Tiffin		2.69	4			
Oregon.						
Glenora		3.00	21			
Pennsylvania.						
Cedarrun				1.50	1 00	26
Warren				1.33	1 00	6
South Carolina.						
Allendale		7.45	*			
Central		2.70	2			
Conway		3.05	21-22			
Gaffney City		3.95	22-23			
Greenville		3.83	21-22			
Holland		3.00	1			
Mount Carmel	10.64	3.11	1-2			
Smiths Mills		5.00	21-22			
Trenton		4.50	*			
Yemassee		7.30	*			
Tennessee						
Benton		2.65	2-3			
Bristol		3.62	3			
Chattanooga		4.30	1-2			
Clinton		3.66	2-3			
Decatur		2.75	1-2			
Elk Valley		2.52	4-5			
Harriman		2.53	2-3			
Kingston		4.65	2-3			
Knoxville		5.68	2-3	4.06	3 09	2-3
Lynnville		2.60	21-22			
Maryville		4.34	2-3			
Memphis		2.57	29-30			
Newport		2.66	2-3			
Oakhill				1.15	1 00	5
Sewanee		3.30	2			
Tracy City		2.59	22			
Texas.						
Alvin				1.20	0 55	17
Arthur City		2.70	11			
Ballinger		2.62	19			
Galveston		4.82	17-18	3.32	1 05	17
Jacksonville				1.25	0 15	1
Virginia.						
Bedford		3.47	22			
Burkes Garden		2.93	22			
Charlottesville		2.83	22-23			
Clarksville				1.53	1 05	5
Clifton Forge		3.10	22			
Farmville		2.91	22-23			
Lynchburg		4.16	22-23			
Richmond.				1.16	0 55	23
Rockymount		3.35	23			
Standardsville		2.55	22-23			
Tobaccoville		3.74	22-23			
Wytheville		4.06	3			
West Virginia.						
Elkhorn				2.17	1 25	3
Wisconsin.						
Green Bay				1.00	1 00	24
West Indies.						
Basseterre	12.37	7.23	12-13	2.21	1 32	12
Do				1.10	0 20	13
Do				1.39	0 25	20
Bridgetown	19.72	8.49	10-11	1.00	1 00	10
Do		3.04	11-12	1.84	1 03	12
Do		3.06	20-21	2.69	1 40	21

* August 31 to September 1. † September 30 to October 1.

ADDENDUM.

THE CLIMATE OF PUERTO RICO.

Prof. M. W. HARRINGTON, Section Director.

The Chief of Bureau takes pleasure in stating that Prof. Mark W. Harrington is now in Puerto Rico engaged in organizing a section of the Climate and Crop Service of the Weather Bureau. Regular weekly and monthly reports will be furnished at an early date, meanwhile, he has the satisfaction of presenting the following first report from Professor Harrington, dated November 5, relative to the general conditions in Puerto Rico, which was received just in time for insertion in the September REVIEW:

The published observations in Puerto Rico are very scanty, consisting of a total of about nine years at San Juan only, and these are fragmentary, being scattered through twenty years. They show a true tropical climate with a high mean temperature (78.9° F.), and very little difference in season except in rainfall. The coldest month on the average is February (75.7°), and the hottest, June (81.5°), but December to March are very much alike in temperature, and so are the months from June to September. The very coldest month on record is January, 1895 (70.0°), and the very warmest is June, 1878 (86.0°).

The average change from the coldest to the hottest is only 6°, but this is very appreciable to one who has lived long in the tropics. The cool months really seem to the natives to be decidedly cool, requiring additional covering on the bed, and heavier clothing. The coldest temperature on record in San Juan is 57.2°, on a day in January, 1894. The very hottest on record is 100.8°, on a day in May, 1878. The absolute range of temperature observed is, therefore, between 43° and 44°. The former temperature is far above frost, but would seem to the natives very cold, and would check the growth of tropical plants. The latter would seem very hot, for the air of San Juan is very moist and the evaporation of moisture is slow.

The comfort of San Juan as a place of residence, not to mention its healthfulness, is very much increased by the "briza," which is not given in the published reports. This is the northeast trade which has been turned toward the west, until the "briza" comes quite regularly from the east. It is not felt much during the day, but springs up late in the afternoon and lasts through the evening. It is a soft, gentle breeze, laving the body and giving an effect which is most fresh and delightful. It has a regularity approaching that of the sun, and Santurce and Catano, two suburbs of the capital, get it both more strongly and through a larger part of the twenty-four hours. At Catano it may be felt until the middle of the forenoon, and begins again mid-afternoon. At Santurce it makes the nights positively cool.

The year at San Juan is divided into the dry season and the wet season, but the dry season has about as much rainfall as the northeastern States, and the wet season more than twice as much. The dry season embraces the months from December to March, with a rainfall of 10 or 11 inches. It is the most attractive season of the year, relatively dry and cool. It is the proper season for the visits of northerners to San Juan, and winter residents would find its climate very gentle, mild, and safe. The wet season embraces the other eight months in the year, and has a rainfall of 48 to 49 inches, or more than the whole of the year for most of the United States. The total rainfall at San Juan is nearly 60 inches, and the culmination is in November when an average of nearly 8 inches falls.

The rainfall is not excessive. It is equaled in many places in the Southern States and in the northern part of the Pacific coast, and is surpassed in many places. It is less significant from the ease with which the rain comes down. There are few threatenings of storms for days beforehand. There is little wind and little lightning. Rainy days are rare, but rainy afternoons or evenings, for an hour or two, common. The rain begins suddenly, falls heavily, and ends soon.

There is no impression of a rainy climate, except that everything seems constantly fresh and clean.

The healthfulness of San Juan is the greatest of any city in the West Indies. Yellow fever is never at home, and when imported it rarely, if ever, spreads. Malarial fevers are very rare in the city, and some cases of dysentery and typhoid occur. The little city has no waterworks in a condition to be used; it stands on a coral island which rises to a summit of 100 feet or more, and is only three miles long by half a mile broad; there are a few open sewers, and between the city authorities and the heavy rainfalls it is kept quite clean.

The great climatic misfortune of San Juan is the hurricane, which occasionally visits it in the latter part of the rainy season (from August to October). It comes on very much as general storms do in the North, with lowering sky, rising winds, and general threats of an impending storm; but it comes from the east, while our storms are generally from the west. It is much more intense than our storms, but is very much rarer. Its usual earliest sign is a booming sea without apparent cause, for waves propagate themselves faster than wind travels. Hurricanes are rare in San Juan. The last occurred in 1876. They usually pass to the south or west of Puerto Rico.

The climate of the rest of the island is much like that of San Juan, with modifications, due to elevation above the sea, and to changes in the "briza," due to the topography. The change of temperature with elevation is relatively rapid here, being apparently about 4° of temperature to every 1,000 feet.

Now, Mt. Yunque, at the northeastern angle of the island, is, according to the chief of the department of engineers of the island, about 6,000 feet high, and its summit would have a mean temperature as low as that of many places in the States. Besides, elevations of 2,000 feet are not unusual for towns. Snow apparently never falls on the island, but hoar frosts are reported as occasional in high places. Several towns of some size in the interior have a popular reputation as being cold—Cayay, Adjuntas, and Utuado. That black frosts do not occur, however, is evident from the fact that the banana grows freely up to at least 2,000 feet and is very sensitive to frost.

There appears to be three mountain ridges running from end to end in the island, but the central is the commanding one, and the elevations are on the whole highest toward the eastern end and especially at the northeastern angle. The result is that the "briza" most wets and refreshes the eastern end of the island and the rainfall changes greatly from point to point. Judging by Jamaica, of which the climate has been carefully studied, the heaviest rainfall is in the northeast and it may here in places amount to 100 inches annually, or more. In Jamaica it is known to surpass 200 inches in some places, and El Yunque as seen from San Juan is very generally capped by rain cloud. The interior valleys of the island are relatively dry, while the northern and eastern mountain slopes are wet. A few protected places are reported as so dry that rain may not fall for an entire year or more, but these spots must be small.

The general appearance of the island is most attractive and vernal. The vegetation is luxuriant and clothes the mountains to their very summits. Very little bare rock is seen anywhere. The island is one of the best watered in the world. It is said to have 1,200 streams with names, of which 71 can be called rivers, and 5 or 6 are of considerable size. In crossing the island from Ponce to San Juan on the mountain road, one crosses over 50 bridges besides fording several streams at the southern end. Waterpower is extremely abundant and could provide power for a large part of the work required in the island. It suffers however the marked disadvantage that the streams are subject to sudden and severe floods. Two or three weeks ago the Coamo River rose 15 or 20 feet and fell again in one night. Its highest point was marked by the limbs of trees and other vegetation which it had plastered against the arches of a high bridge. A heavy afternoon rain in the mountains about its source had caused the sudden rise.

Chart I. Tracks of Centers of High Areas. September 1898

Chart I. Tracks of Centers of High Areas. September, 1898.

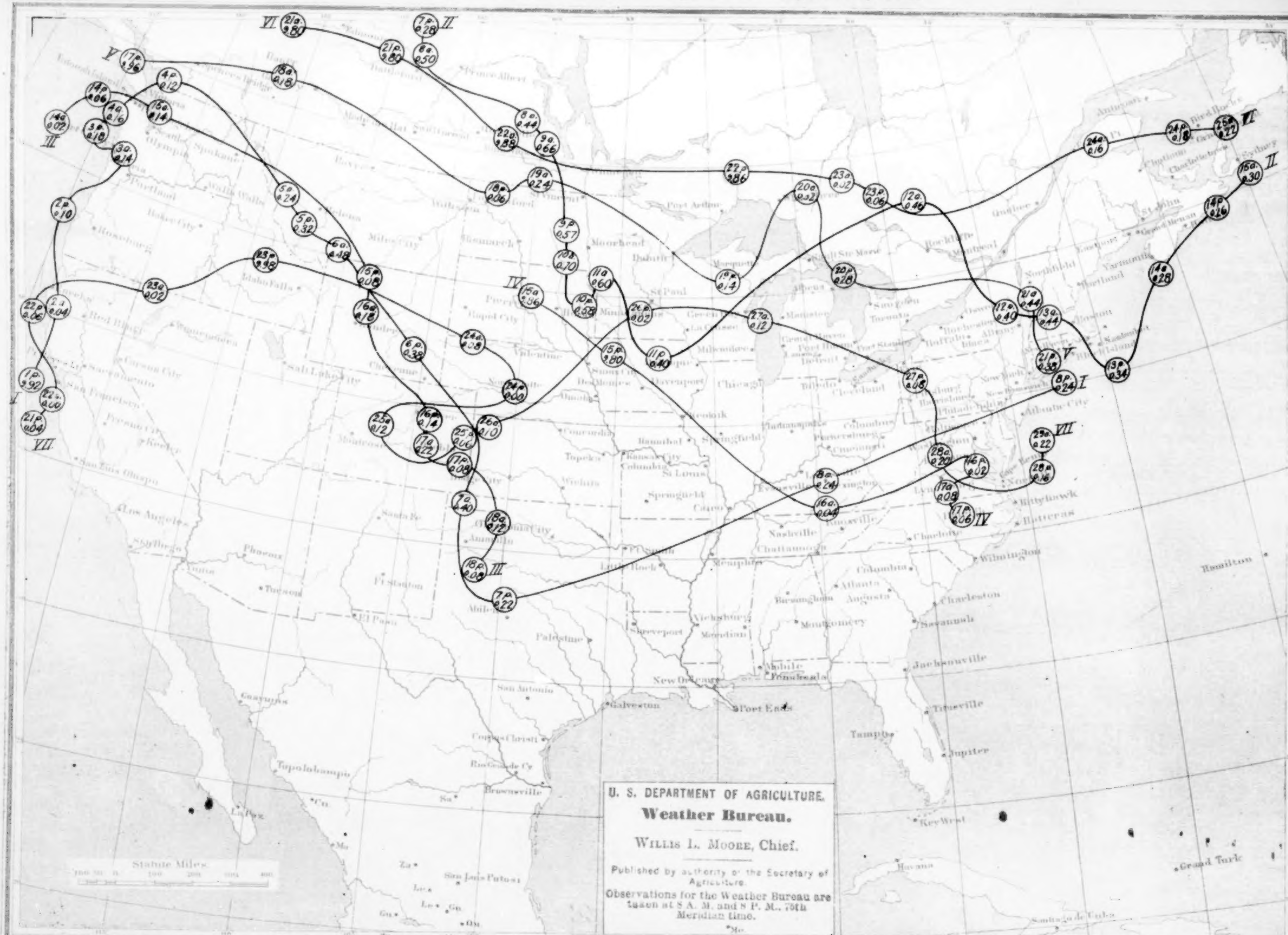

Chart II. Tracks of Centers of Low Areas. September, 1898.

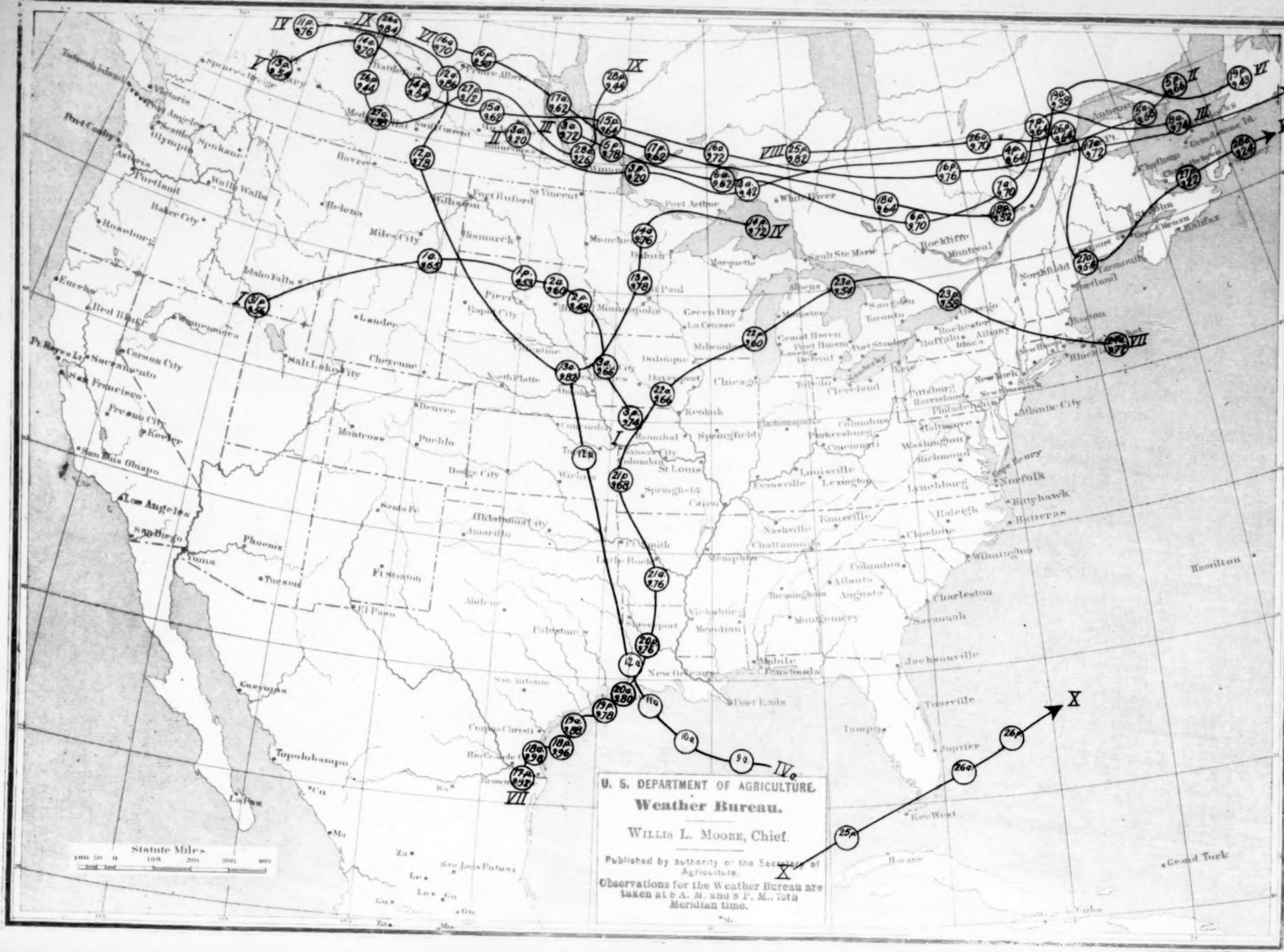

Chart III. Total Precipitation. September, 1898.

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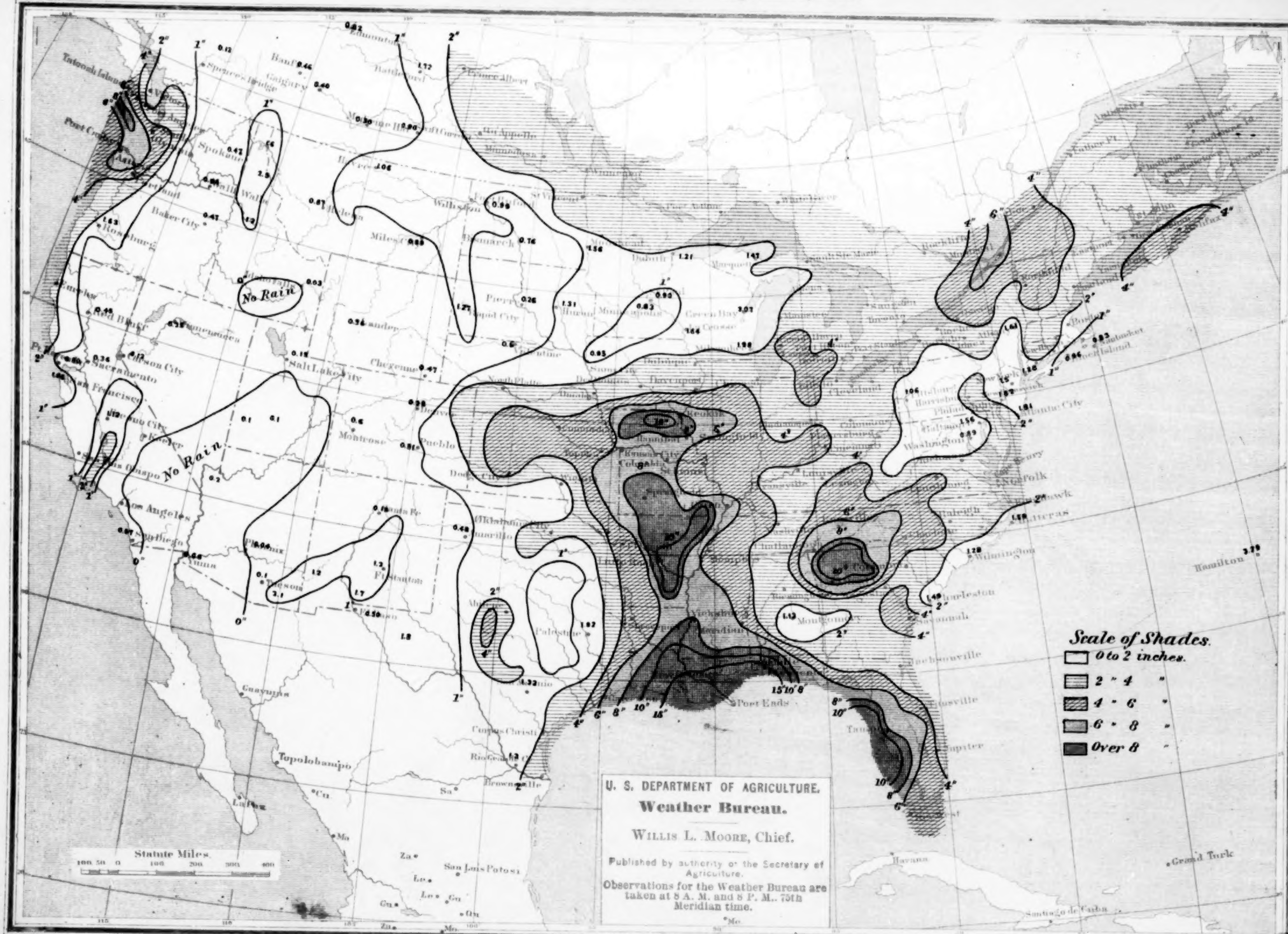
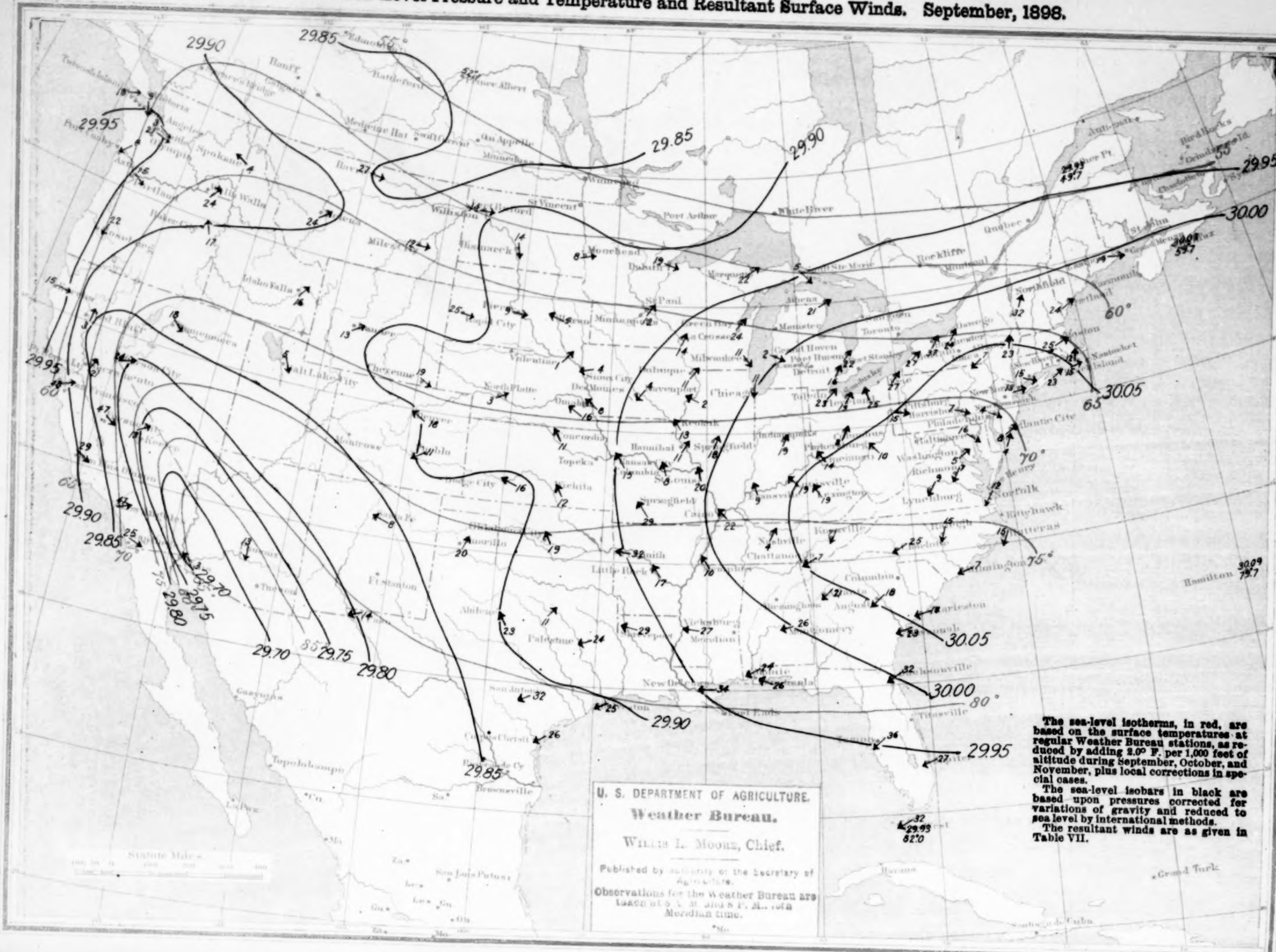


Chart IV. Sea-Level Pressure and Temperature and Resultant Surface Winds. September, 1898.



The sea-level isotherms, in red, are based on the surface temperatures at regular Weather Bureau stations, as reduced by adding 2.0° F. per 1,000 feet of altitude during September, October, and November, plus local corrections in special cases.

The sea-level isobars in black are based upon pressures corrected for variations of gravity and reduced to sea level by international methods.

The resultant winds are as given in Table VII.

Chart V. Hydrographs for Seven Principal Rivers of the United States. September, 1898.

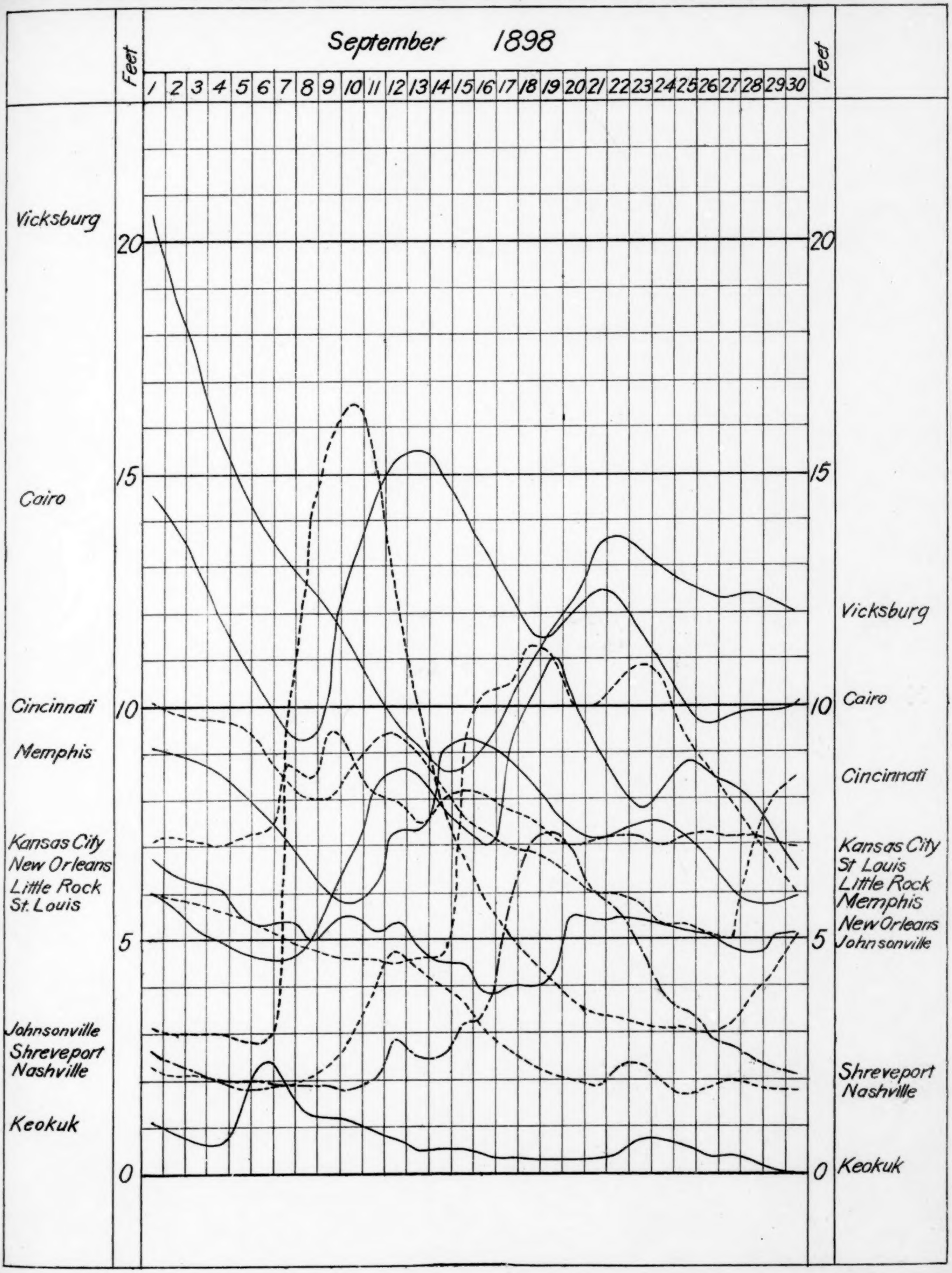


Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. September, 1898.

Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. September, 1898.

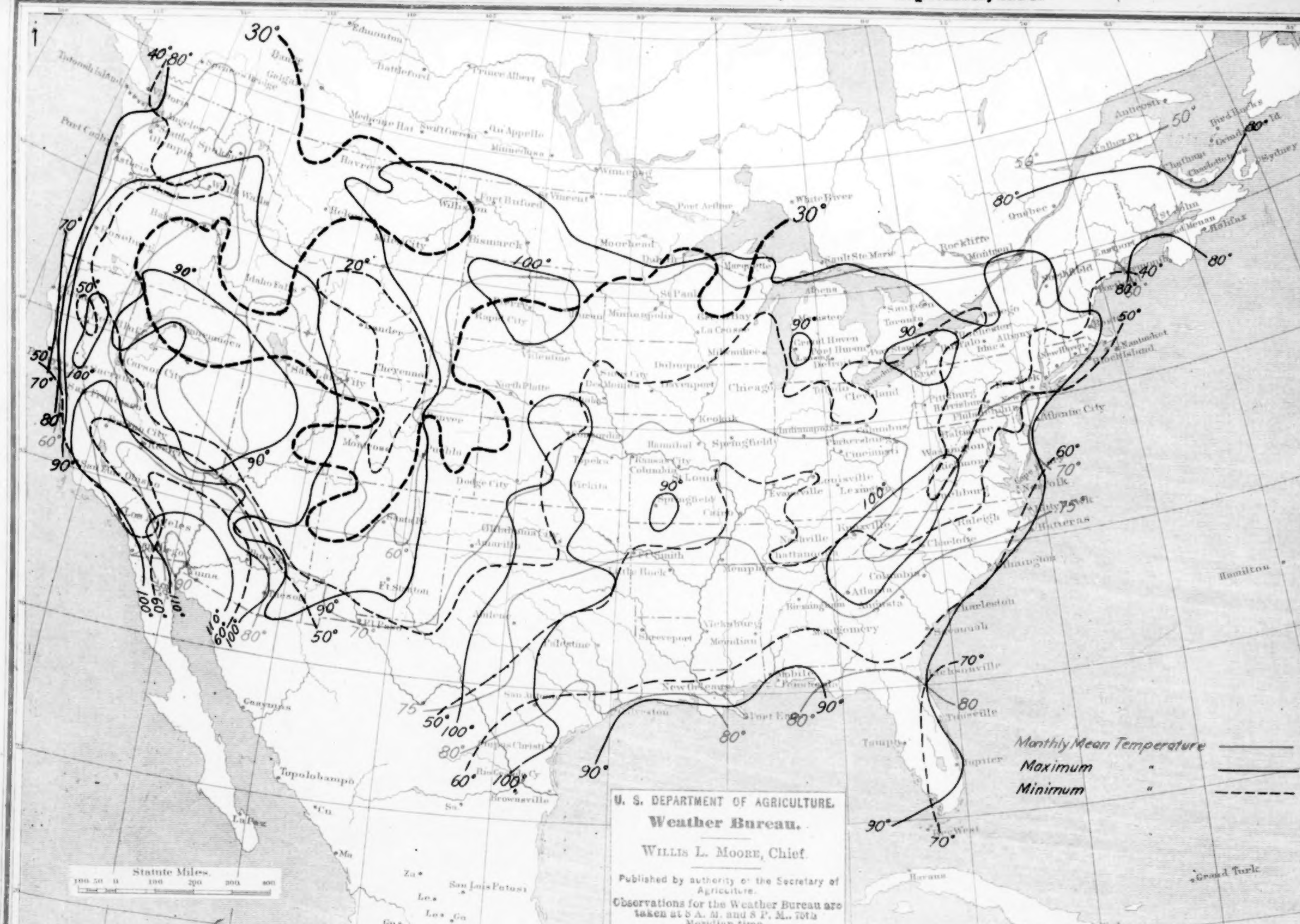


Chart VII. Percentage of Sunshine. September, 1898.

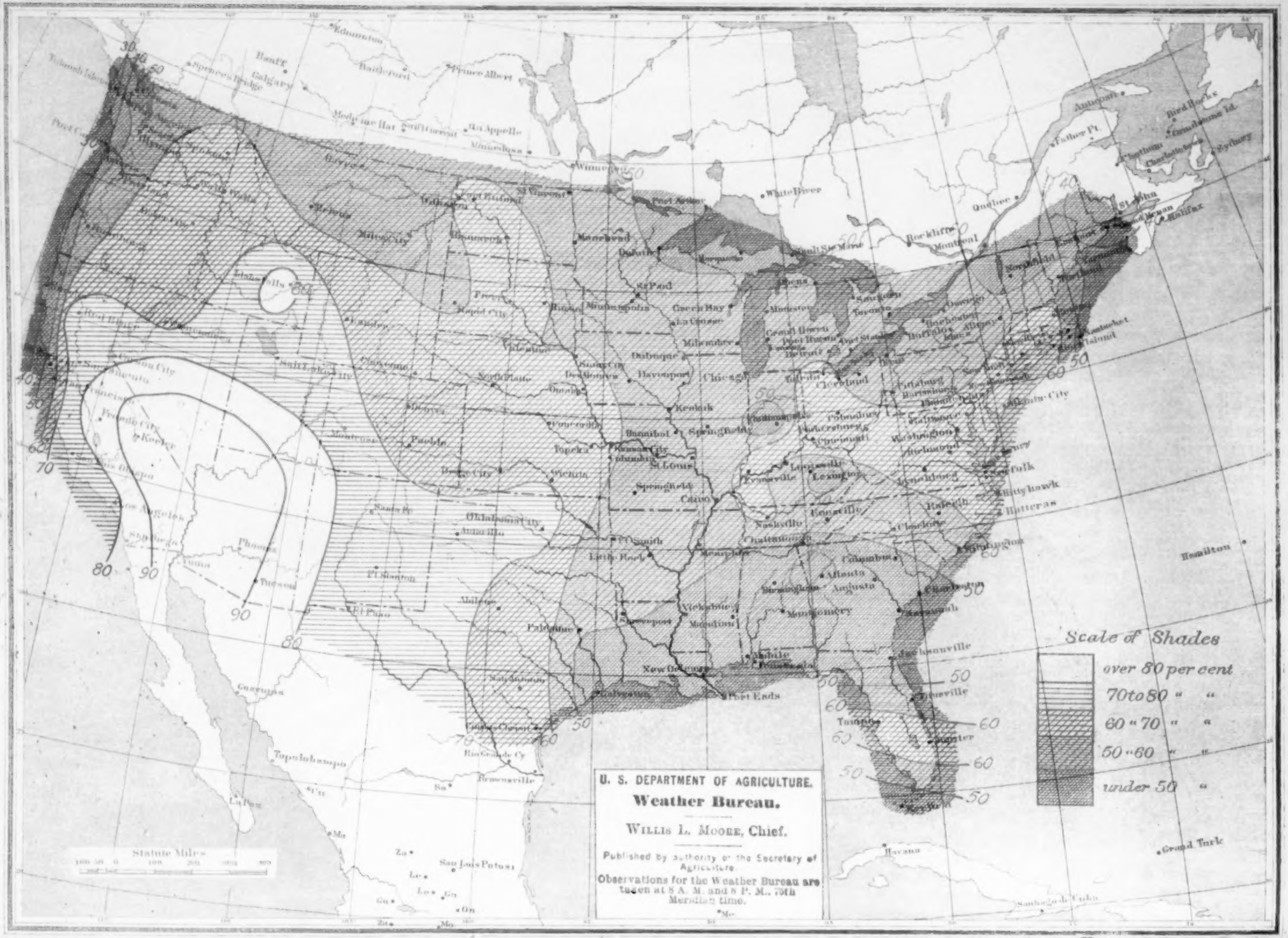


Chart VIII. Signal Apparatus at Atlantic City, N. J.

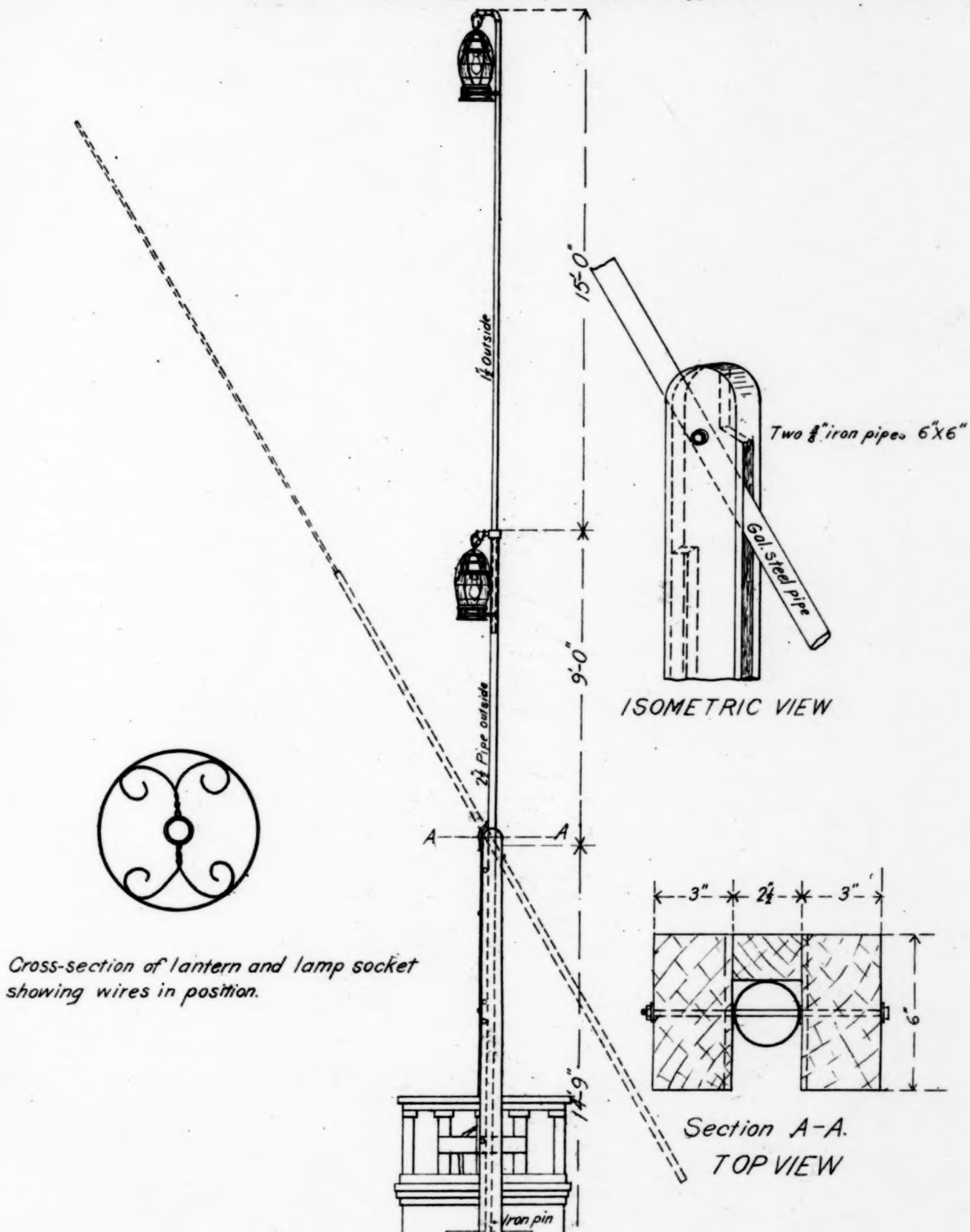


Chart IX. Cloudiness During the Total Eclipse of 1900.

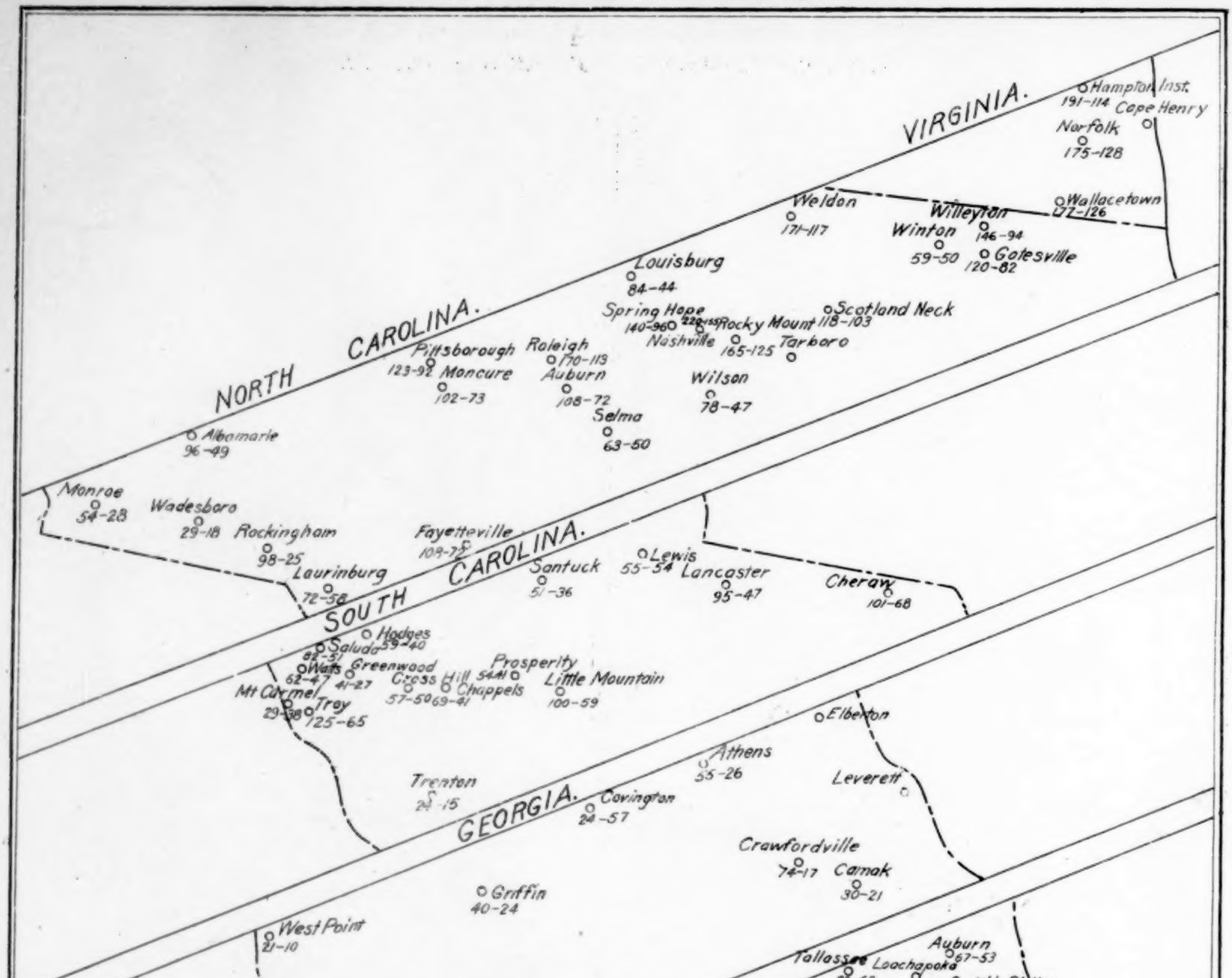


Chart X. Tracks of West Indian Hurricanes. August, 1878-98.

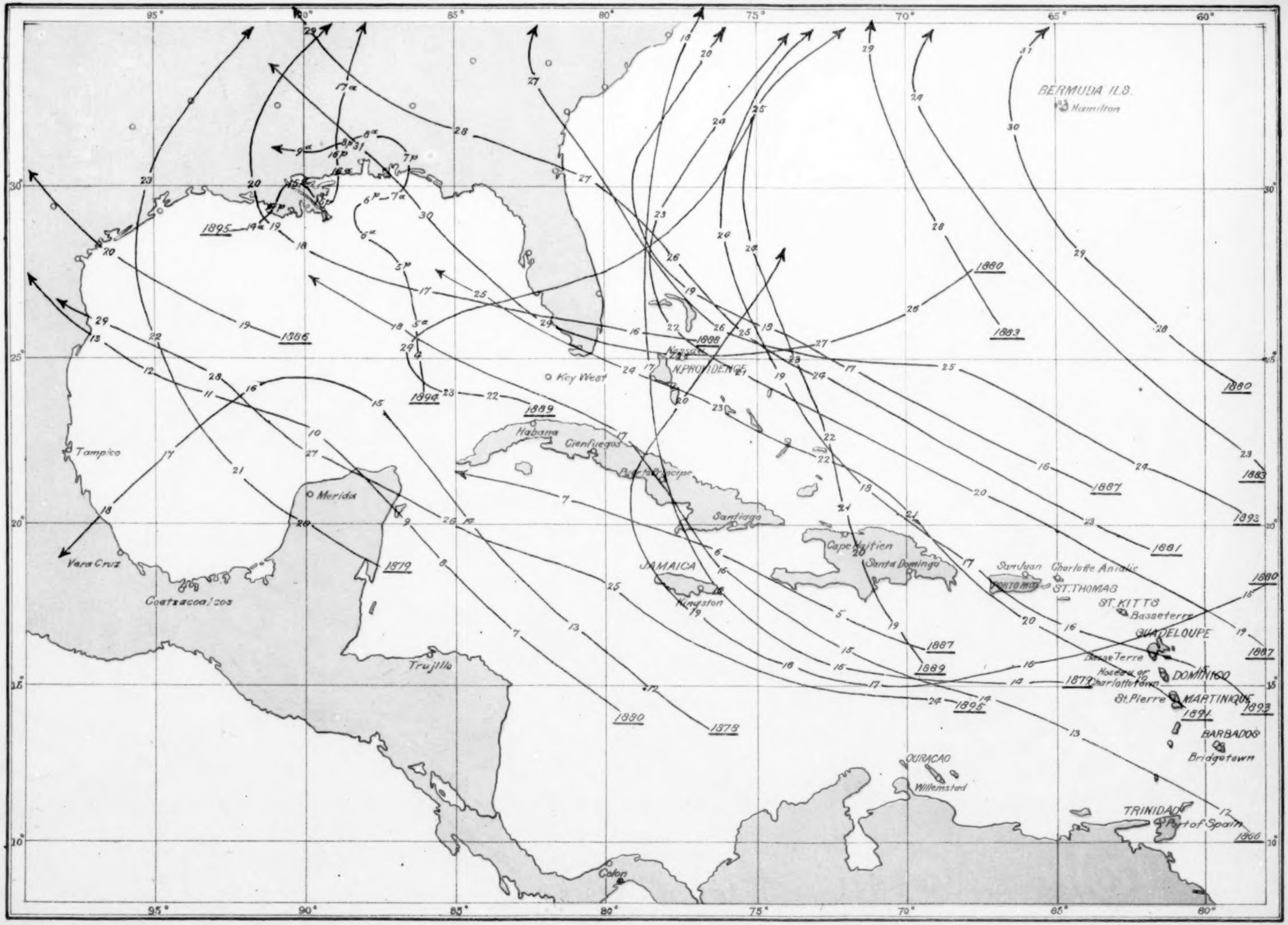


Chart XI. Tracks of West Indian Hurricanes. September, 1878-98.

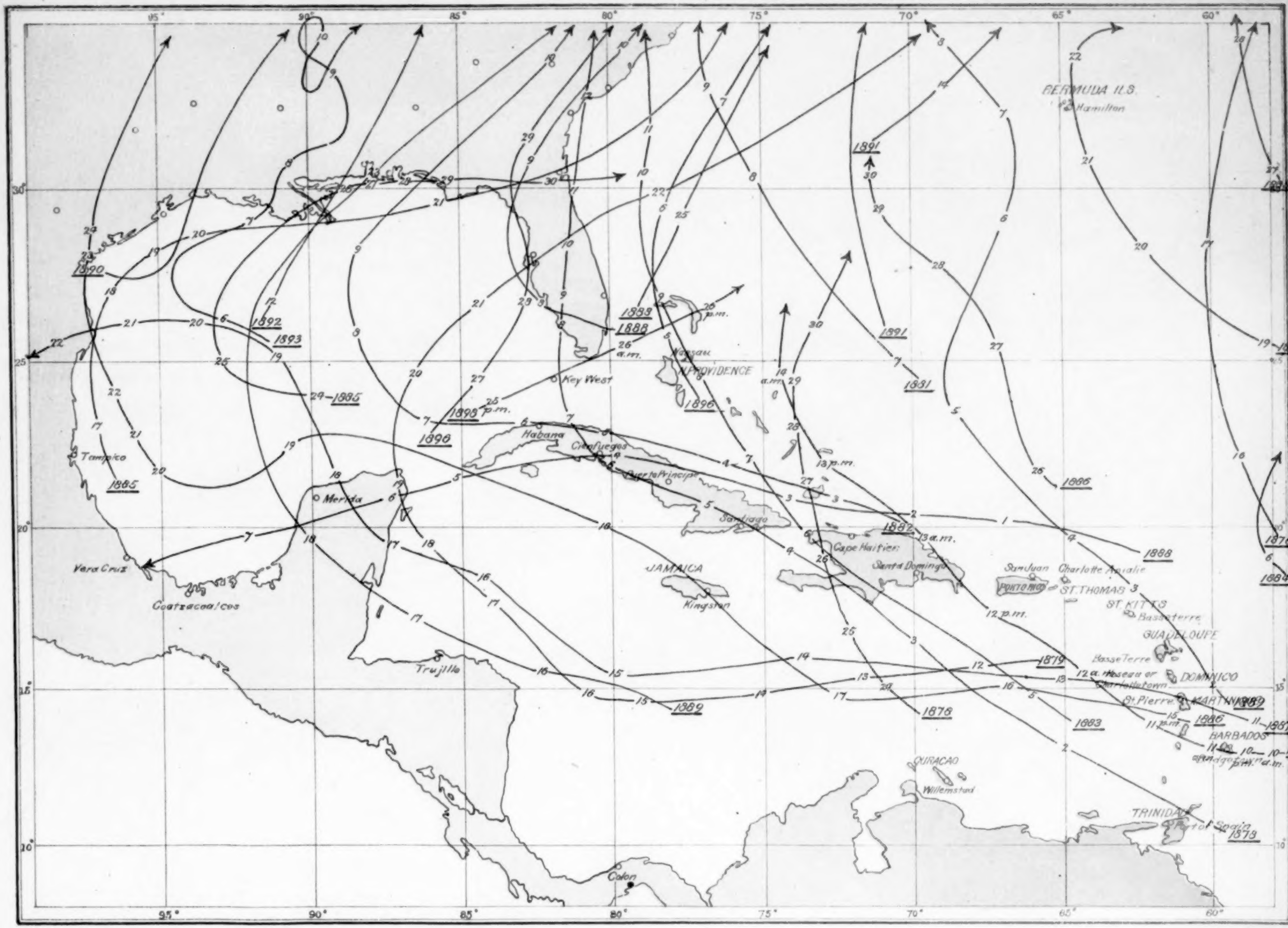


Chart XII. Tracks of West Indian Hurricanes. October, 1878-97.

Chart XII. Tracks of West Indian Hurricanes. October, 1878–97.

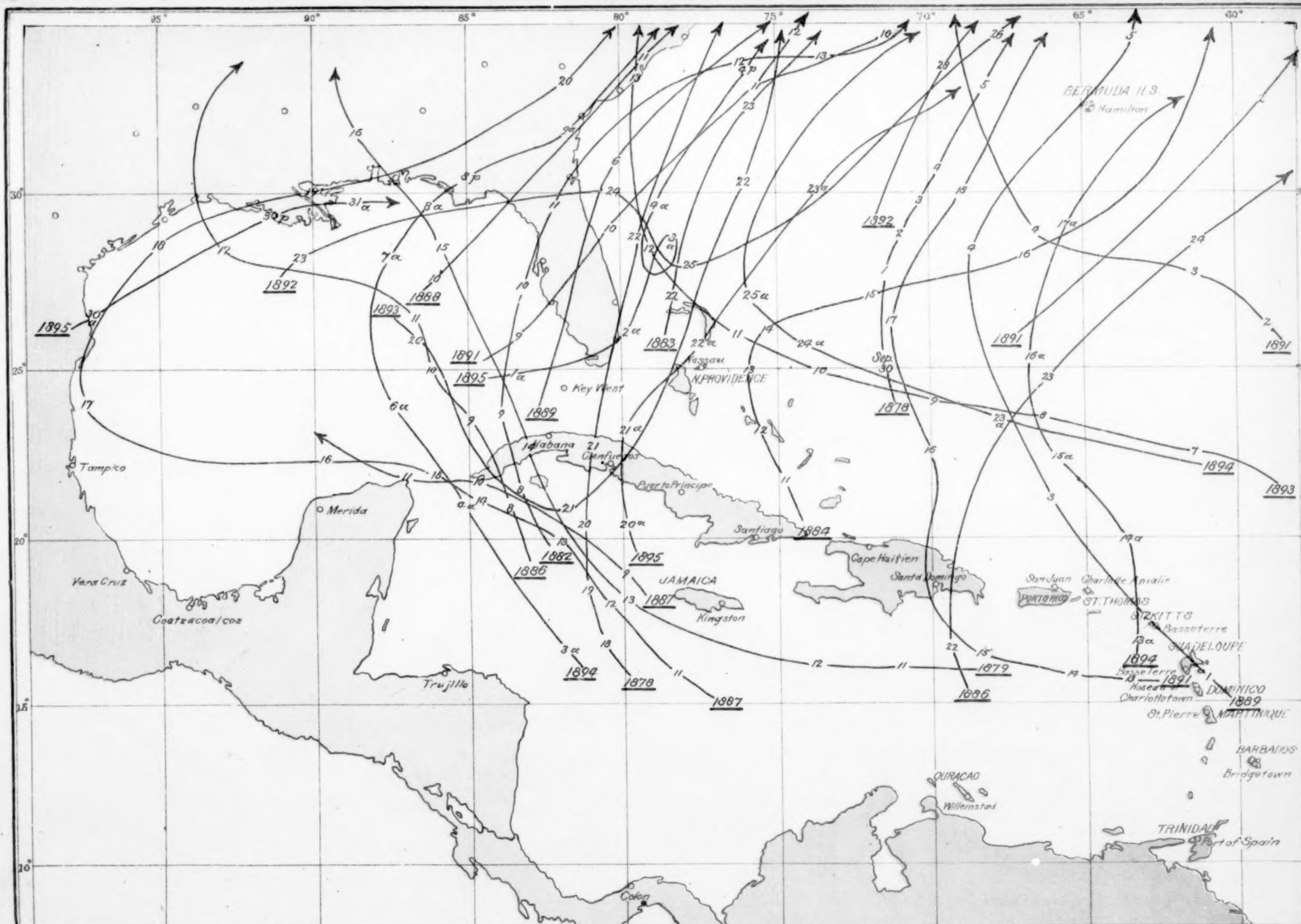


Chart XIII. West Indian Cables and Weather Bureau Circuits.

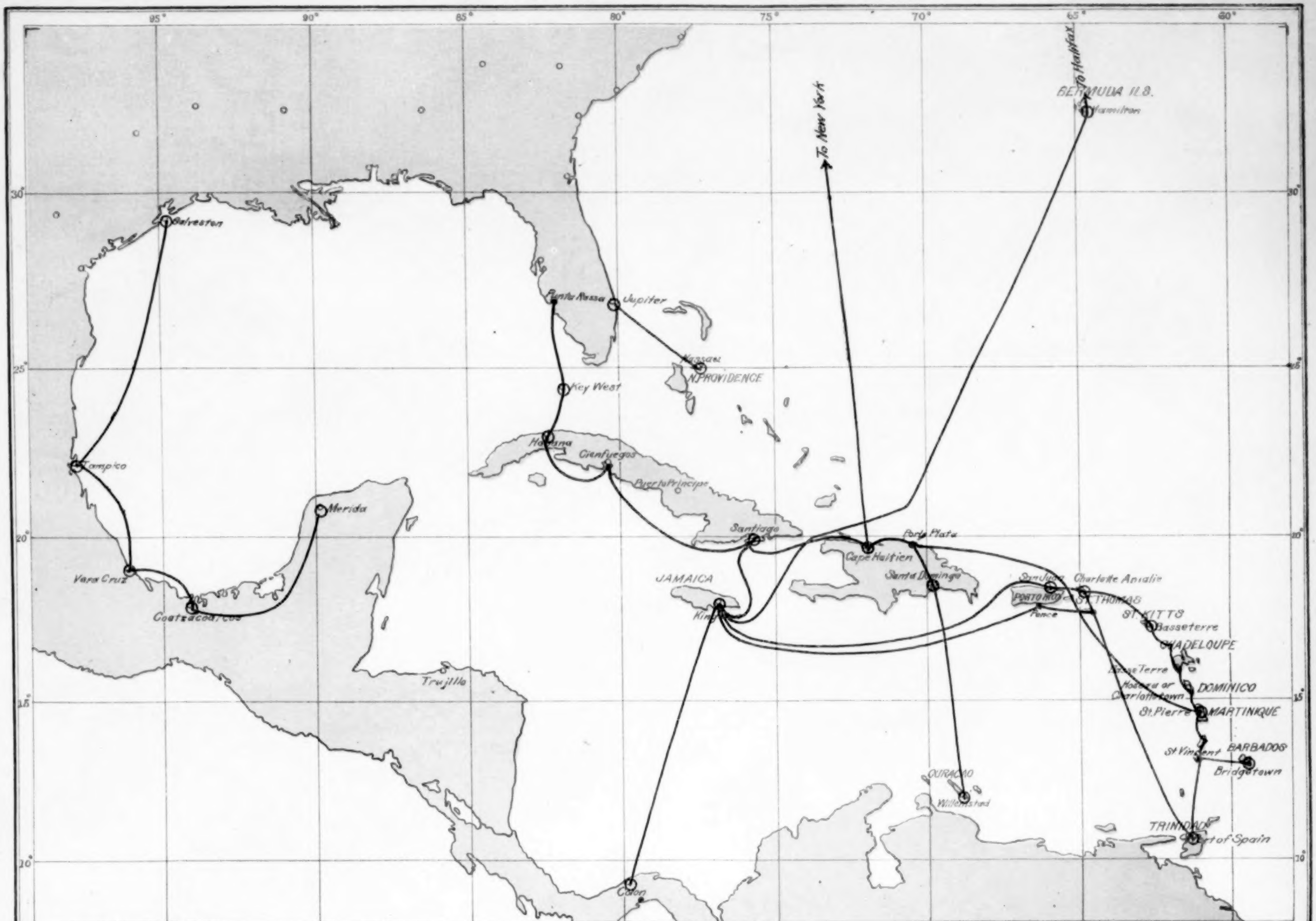
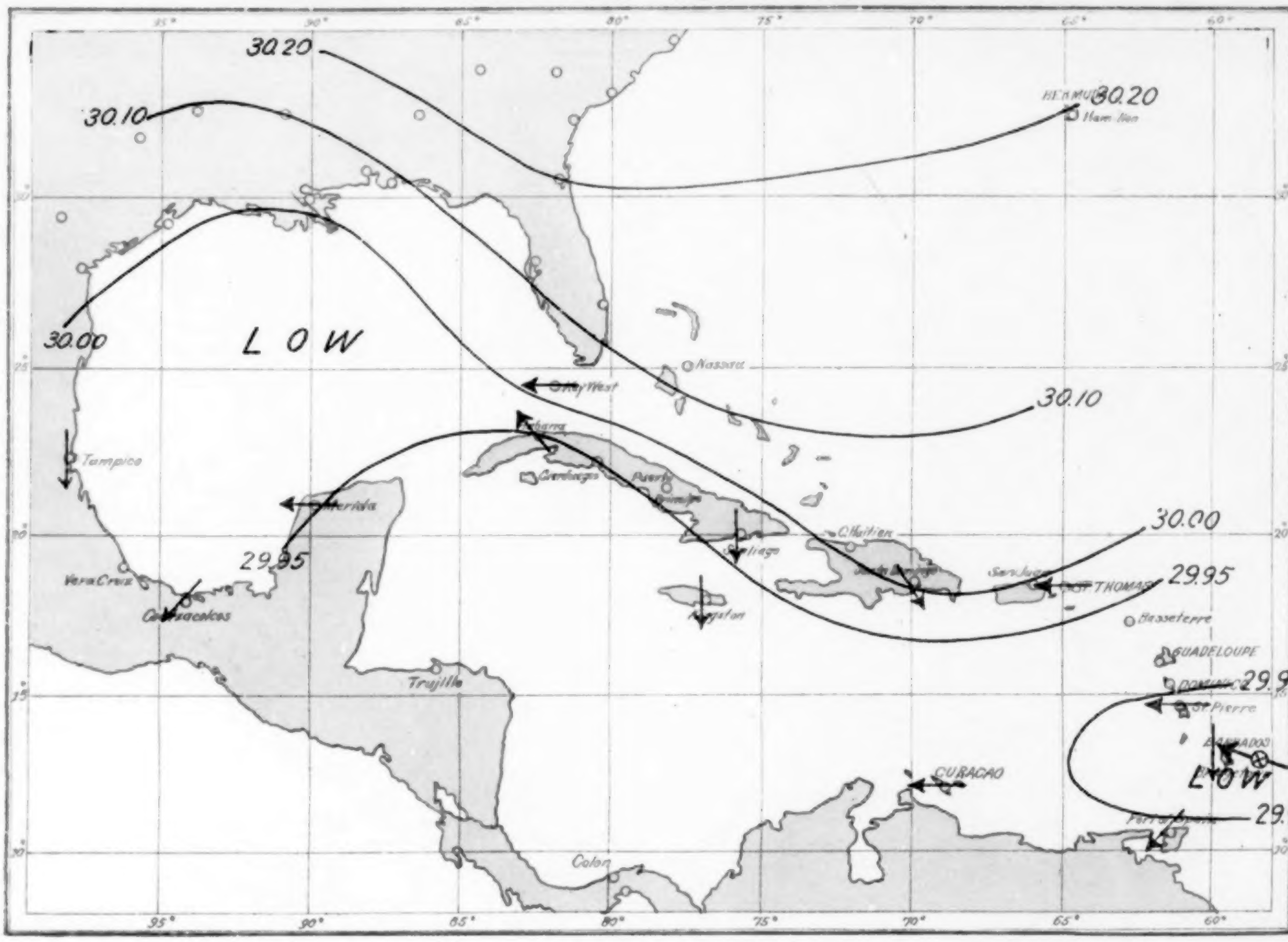


Chart XIV. Weather Charts. September 10, 1898—Morning.



Evening.

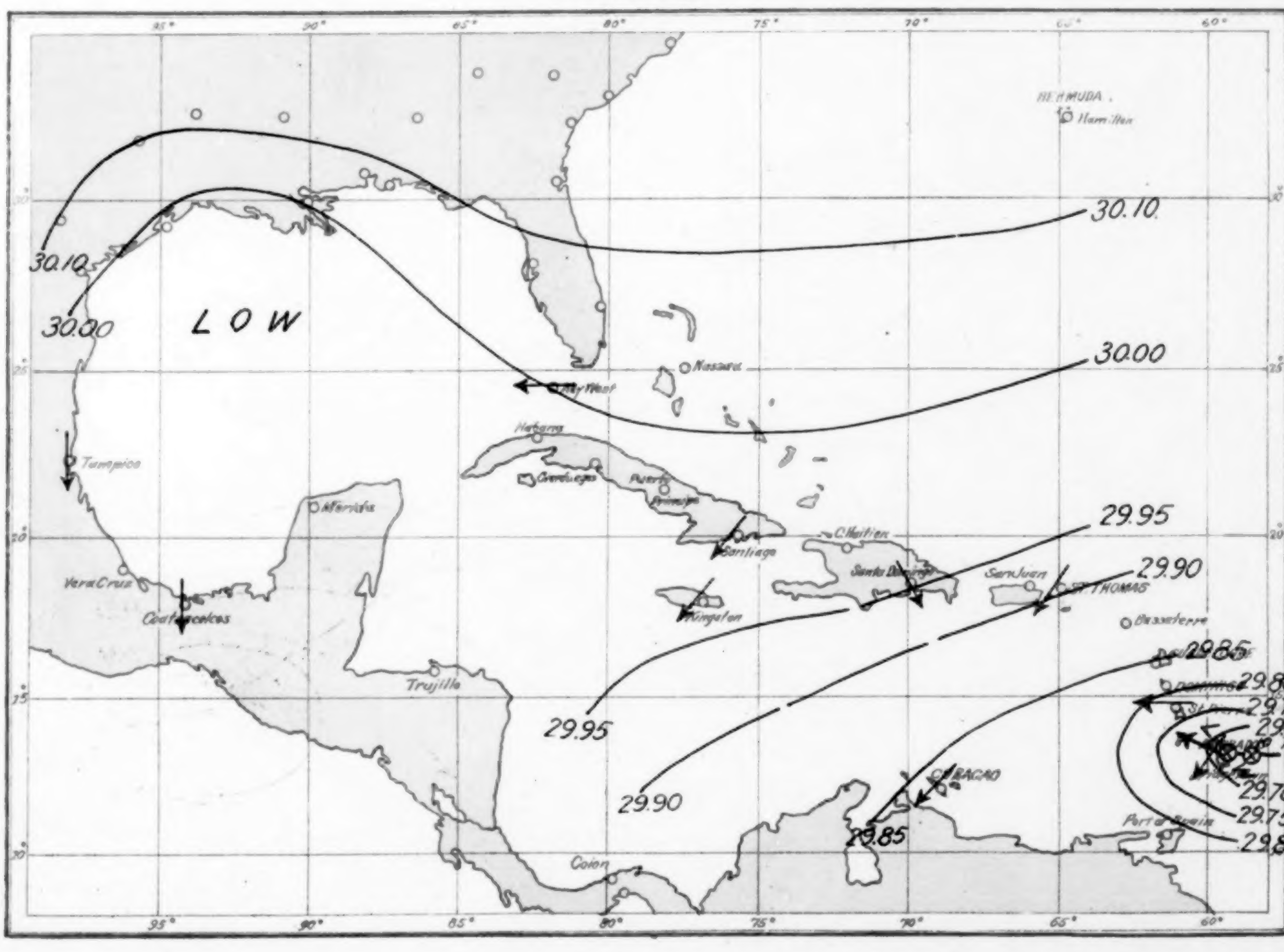
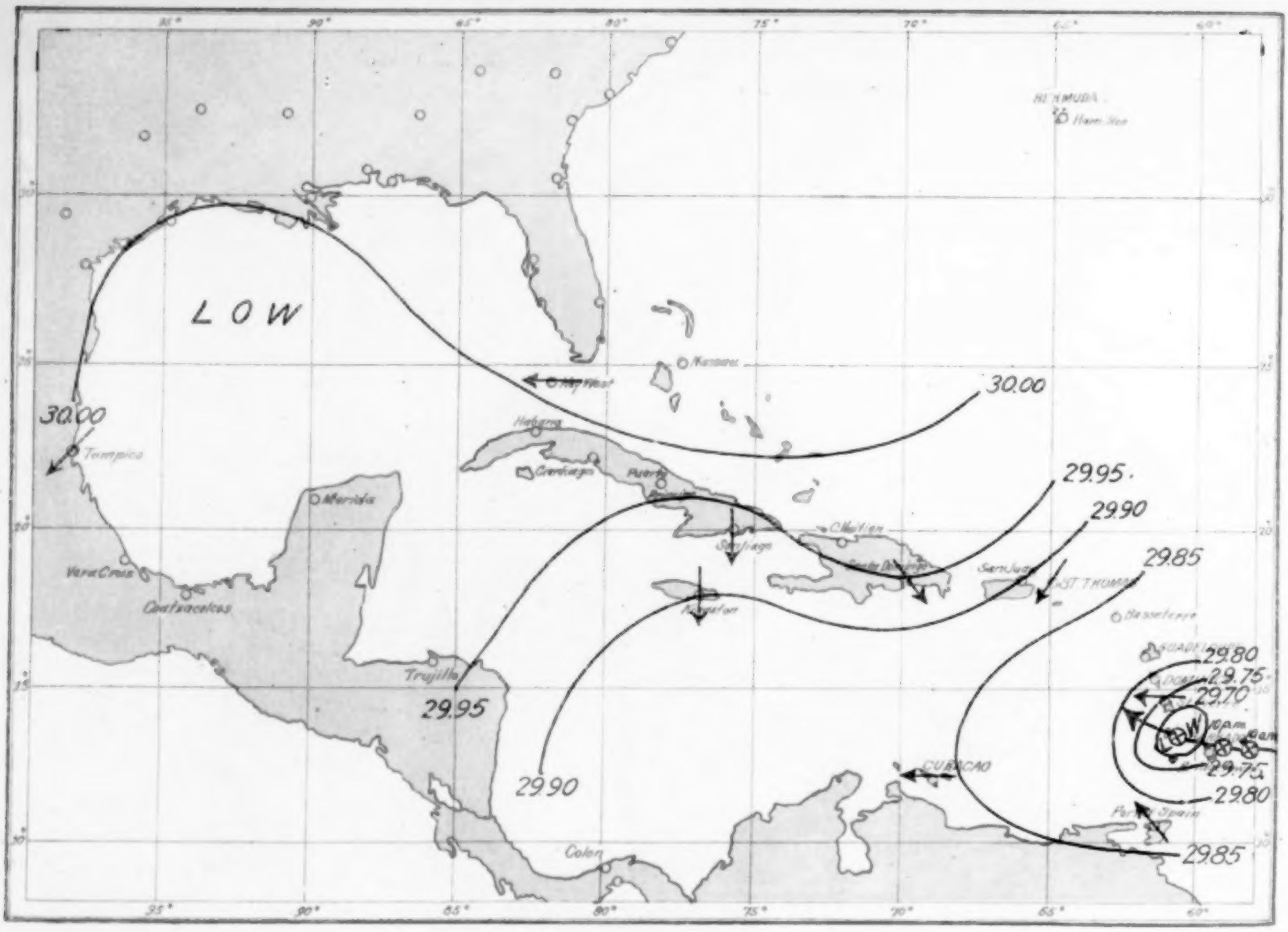


Chart XV. Weather Charts. September 11, 1898—Morning.



Evening.

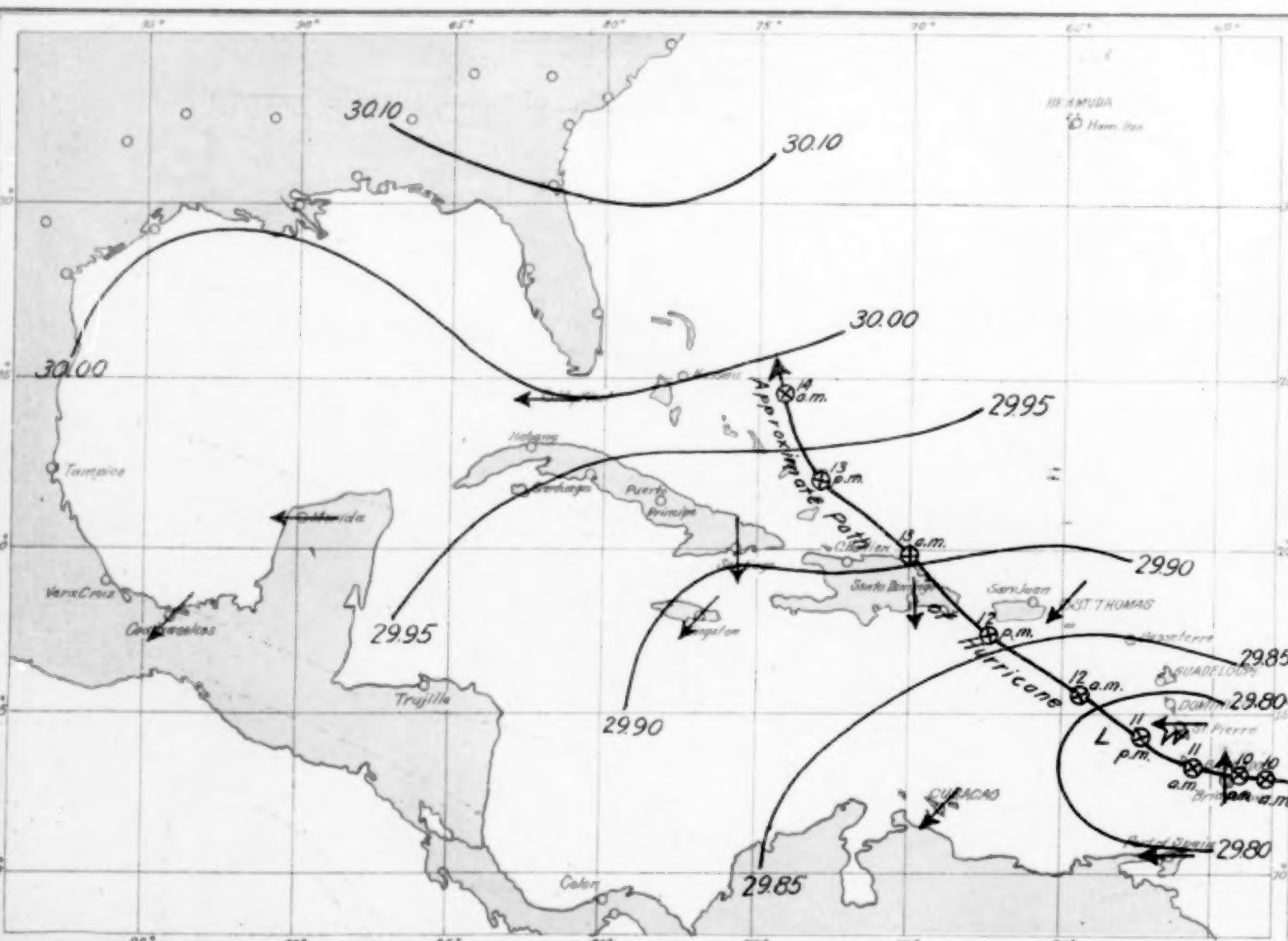


Chart XVI. Hailstorm in Nodaway County, Mo.

Fig. *a*.

Fig. *b*.

Chart XVII. Hailstorm in Nodaway County, Mo.